1920—Our Twenty-Fifth Anniversary—1945

Contractors and Engineers Monthly

Vol. 42, No. 7 JULY, 1945 $3 a Year, 25 Cents a Copy

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Covering the Field

Bridge Slabs Precast
Precasting of concrete piles and deck slabs and placing from barges featured the construction of a 1,572-foot bridge. See page 1.

Levee Enlargement
Like the river itself, levee work along the Mississippi goes on forever. A typical small contract for levee enlargement involved 61,000 cubic yards, handled by draglines (page 1).

County Road Work
The county organization, equipment, and shops for looking after 1,225 miles of state, county, and town roads are described in this issue (page 1). In another county, where bridge problems loom large, a perpetual bridge inventory system has proved of great value (page 27). Other county articles appear on pages 67, 81, and 83.

Dredging in Pacific
The story of the conversion of the dredge Gulf Stream to the YM-20, in service with the Seabees in the western Pacific, and its work in handling hard coral in harbor improvement, is told in text and photos on page 2.

Airport Access Road
Grading, gravel base, road-mix surfacing, and a concrete retaining wall were involved in the contract for a new airport access road (page 6).

Drainage Improved at Airport
To correct soil erosion at a southern Army airport, an 80-foot-wide drainage apron was constructed along the runways, consisting of hot-mix paving on a sand-clay base (page 11).

Highway Maintenance
The use of Mud-Jacking to raise a concrete pavement to meet a new railroad grade is described on page 30. Pumping at joints in pavement slabs has been corrected successfully by pumping in asphalt cement (page 85).

Ditch Linings
Three ways of stabilizing ditches to prevent soil erosion, including a semi-flexible lining of concrete blocks which is easily installed and maintained, are discussed on page 33.

Invasion Breakwaters
Another "now it can be told" story of the achievements of U. S. Engineers overseas relates how a General Service Regiment was transformed into a speedy construction crew to build the gigantic concrete and steel structures used for invasion harbors in Europe (page 39).

Highway Division Shop
An attractive structure with well landscaped grounds and carefully laid-out interior keeps state highway department division equipment in working order. See page 68.

(You will find "In This Issue" on page 4)



C. & E. M. Photo
In this county shop is maintained the equipment to take care of 1,225 miles of state, county, and township roads.

County Maintains All Roads in Area

Single Central Shop, Large Equipment Roster, and Well Organized Patrol System for Total 1,225 Road Mileage

✦ BROWN County, Wis., of which Green Bay is the county seat, is well organized to maintain the 1,225 miles of state and county trunk highways, township roads, and village streets within the county. In Wisconsin, the State Highway Commission contracts with the counties for the upkeep of all state highways within their boundaries. Townships and villages follow a similar course; thus the county organization has a continuous demand for the services of its equipment.

Although Brown County is only about 20 miles square, it contains 150 miles of highways on the state system, 275 miles of county trunks, and 800 miles of township roads and village streets. All

(Continued on page 59)

Piles and Deck Precast For New River Crossing

By THEODORE REED KENDALL, Editor

Diamond Construction Co. Saves Extensive Falsework; Features of Casting Yard And Handling of Materials

✦ A STUDY of the 1,572-foot bridge project across the Mattaponi River at West Point, Va., by the contractor showed that an excessive amount of falsework for casting the thirty-three 40-foot spans would be necessary. This led to the plan to precast the 110-ton deck slabs in a yard on shore, move them to a barge by a gantry spanning both the casting yard and the barge, and set the slabs by using the ebb tide and careful ballasting of the barges.

Replacement of the old timber-pile-bent bridge which joins King William County and King and Queen County became necessary when heavy Navy truck traffic began overloading the weakened piles as military activities stepped up along the shore of the York River below the bridge. Coincident with the placing of a new approach fill by state forces, the contract for the new concrete-pile bent and T-beam deck structure with a 250-foot center swing span was awarded to the Diamond Construction Co. of Washington, D. C. The $403,761.52 contract was signed June 13, 1944, and work started sixteen days later with 280 calendar days allowed for completion.

The State planned to use the old bridge for traffic during construction, but a 262-foot section at the east end was wrecked by the mud wave from the approach fill for the new bridge, placed by state forces, and had to be rebuilt at a cost of $18,000. The old and new bridges are about 200 feet apart at the easterly end and about 1,000 feet at the westerly. The east approach fill was made by end-dumping, using material from two pits about a 1½-mile haul from the bridge. One pit contained a rather silty material which became slippery when wet so the gravel from the second pit was used for topping which enabled traffic to keep going. Cores show that the new fill goes down 55 feet into peat and silt which accounts for the heavy mud wave. A section of the detour bridge, replacing the damaged section of the old bridge, was made of a 50-foot steel-truss bridge salvaged from a secondary road.

Features of New Bridge

The new bridge structure consists of twenty-four 40-foot spans at the east end and nine similar spans at the west end, with the 250-foot through-truss swing span on a 30-foot 6-inch cylindrical pier. The concrete-pile bents consist of five piles with the two outside

(Continued on page 16)



Photo by Whitaker
To line up the three precast reinforced-concrete plumb piles and two batter end piles for each bent in the West Point, Va., bridge, the Diamond Construction Co. used structural-steel multiple leads which were easily handled by one of the Wiley-Whirleys.

Lift Added to Levee On Lower Mississippi

T. L. James & Co. Used Two Draglines and a Bulldozer To Handle 61,000 Yards On Merrit Levee Contract

✦ TYPICAL of the many small contracts in levee construction along the Mississippi River was the addition of a second lift to the Merrit levee at Violet, La., by T. L. James & Co., Inc., of Ruston, La. This second-lift enlargement, consisting of moving 61,000 cubic yards of earth along a total length of 5,800 feet on the east bank of the river about 14 miles below New Orleans, was done under the direction of the U. S. Engineer Office, New Orleans District. Like most other projects of this type which are constantly being worked to keep the Father of Waters in bounds, the Merrit levee was done with the minimum of manpower, with a consequent saving in the cost of construction. All of the dirt moving was done by one dragline, while a second dragline dressed the newly built embankment.

In 1944 the levee had been moved back to its present location under another contract by Robinson & Young of Baton Rouge, La. At that time it was not fully built up to its intended height in order to give the first lift a chance to consolidate and become firm enough to bear the weight of the additional material. If this levee had been constructed to the final grade in one operation, there would have been danger of slides and also of foundation failures in the land along the levee. These failures are an old story to levee builders, and may occur on either the land or the river side of the embankment. When the ground immediately beneath the fill is overloaded, the levee will sink, causing an upheaval at the weakest point in the ground nearby. From the time of the building of this levee in the latter part of the nineteenth century, it has already been moved back

(Concluded on page 23)

Giant Dredge Towed Halfway Round World To Dig Road to Tokyo

McWilliams' Gulf Stream, After Outstanding Career on The Mississippi River and in Atlantic, Enters Pacific War

By R. P. DAY, CCM, USNR

✦ IN a voyage rivaling that of Christopher Columbus in the Santa Maria in 1492, a 165-foot hydraulic pipe-line dredge recently crossed the open ocean halfway around the earth and is now digging on the road to Tokyo in the western Pacific. The dredge is the Gulf Stream, owned by McWilliams Dredging Co. of Chicago and New Orleans until 1944. The Gulf Stream was then purchased by the U. S. Navy, renamed the YM-20, and moved across the ocean by a Navy tug.

The Gulf Stream was built in the Nashville yards of the Nashville Bridge Co. which constructed her 165 x 44 x 13½-foot steel hull under contract. She was designed by Jean M. Allen & Co. of Chicago to McWilliams' specifications. The McWilliams Dredging Co. installed most of her modern machinery after the hull was finished in 1936, and the Gulf Stream was hailed as the most modern dredge then afloat in the Gulf region.

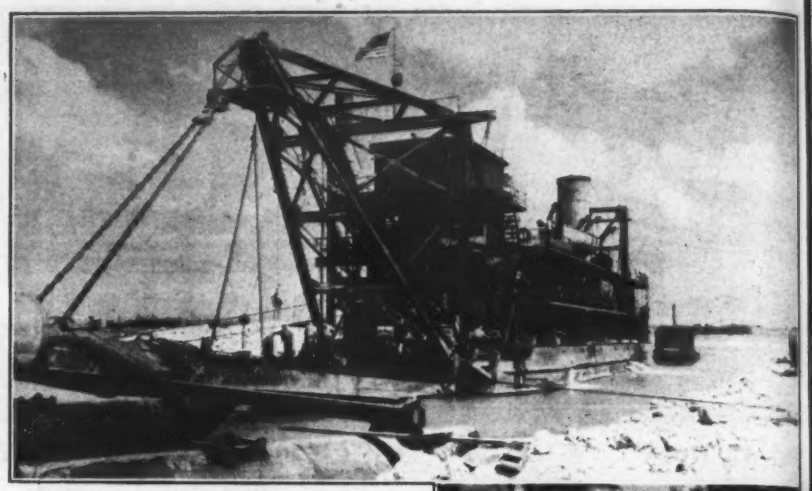
Under supervision of the Army Engineers, she dug Mississippi River sand and silt for two years as a part of the channel maintenance program. In 1938 she was towed to the Potomac River at Washington, D.C., and began the huge task of throwing up the fill for the Washington Airport, one of the biggest air terminals in service in the States.

In May, 1941, the east coast work was finished. With the possibility of war with Germany more pronounced, the United States began to develop strategic naval bases off the east coast and through the Caribbean. The Gulf Stream was towed to Bermuda. Here she ran into the hardest digging she had encountered thus far, but she gave a creditable performance under her skipper, Captain A. L. Wiseman of McWilliams, and finished the job on schedule without having run into any coral so tough she could not handle it. Completion of this job helped in no small way to break the German submarine menace then prevalent over almost all of the north and south Atlantic.

Back to the Mississippi River she went, to do channel maintenance work for a year (See C. & E. M., June, 1945, page 31). In the business of war logistics, plans are made months ahead for supplies and equipment, so while she was digging there, a group of naval officers were already making the plans which would let the Gulf Stream round out part of her life story many thousands of miles west of New Orleans.

Pacific Duty

Studies of the coral formations in the western Pacific island harbors which needed dredging were fair, and it was known that sturdy dredges would be required. The Gulf Stream (or YM-20 as she is now known), with a 28-inch pump and discharge pipe, and a fairly heavy ladder, had already had experience in coral and it was predicted that she would be able to account for 1,000 cubic yards an hour in the Pacific, provided the coral was not hard enough to require preliminary breaking by explosives. The YM-20, being a modern rig with a good performance record, is a valuable addition to the fleet of other good dredges. Though not essentially a rock dredge, she is being adapted to western Pacific conditions as fast as possible to enable her to perform favorably with the other machines.





McWilliams' mighty Gulf Stream, now the Seabees' YM-20, is moving Pacific coral instead of Mississippi River silt and gumbo or Potomac River sand and gravel. At right, the YM-20's 28-inch discharge line is now set up in tropical scenery.

The YM-20 ran into hard coral as soon as she arrived. Other dredges had tried it before the YM-20. One 24-inch Army dredge broke a cutter shaft and tore loose her A-frame hog-chain supports trying to cut one particularly tough coral shelf. The YM-20 dug this shoal, but she broke a coupling on the cutter drive doing so. Seabees worked 18 hours in a stretch in order to repair the damage.

In an intelligent effort to direct the operation of the different dredges where performance would show to the best advantage, the YM-20 was placed in the hard cuts. These cuts, while they were difficult digging, gave the YM-20 the advantage of a shorter pipe line to disposal areas, and imposed no higher lift than the other machines were facing. This was done because the YM-20 was newer, sturdier, had 28-ton stern spuds to hold her down, and carried an 11-inch cutter shaft driven by 900 hp through reduction gears on her 85-ton 77-foot ladder.

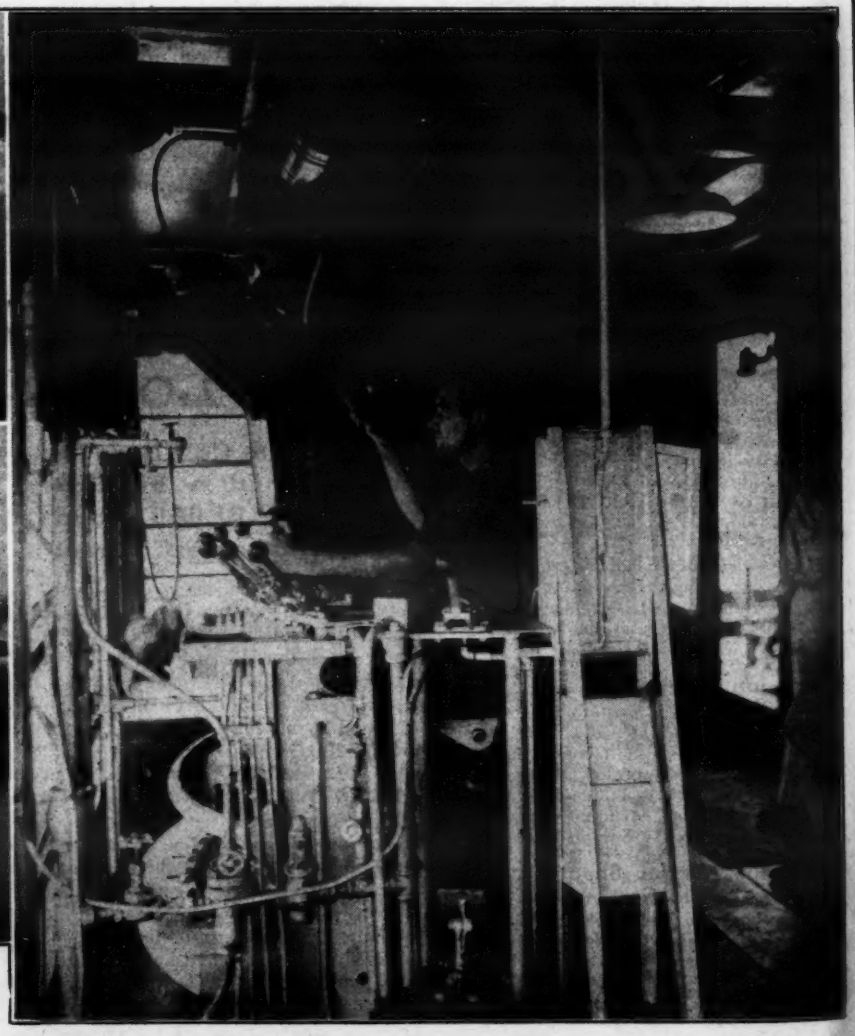
First Job in Hard Coral

The first naval base where work was proposed has a large outer harbor fairly deep and navigable for large vessels. Very little hydraulic dredging was required in the outer harbor, however, since most of this work was straight blasting and clamming of needle-like coral heads rising up to menace navigation. The main harbor opens through a narrow neck to a large inner bay covering several square miles. While a few navigable channels meander between the coral shelves, almost all the inner harbor had to be dredged to a sufficient depth below mean low water, in order to create maneuvering and wharf space. Broad

(Continued on page 76)







The brains of the YM-20, formerly the dredge Gulf Stream, are its control house, with Seabee Elus Trahan on duty, (at right). The auxiliary floating equipment like the big tug Zephyr and the self-propelled anchor scow are her busy helpers on harbor improvement in the Western Pacific.

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Don't Be Too Late, With Too Few Plans!

You know that the Federal government has put up $1,500,000,000 to be matched with $1,500,000,000 by the states for highway construction, and that additional funds for construction amount to another $500,000,000 in the state, county, town, and city fields. That is a lot of money to spend, and you know that it is needed, but it cannot be spent without plans.

All kinds of excuses have been offered in various quarters for the delays in getting out plans. These excuses have come from all levels of highway departments and include no money, no men, and too much politics. There is plenty of money for making plans, because the Federal government has made available to states two separate allotments for that purpose. As for man-power, there was a time when that excuse seemed plausible, but so many states and counties have proved otherwise that no one dares put it up today. Many progressive engineers have gone out and secured women draftsmen; they have called in their experienced construction engineers from the field and have turned them into design engineers. Virginia took the boldest step of all, according to R. P. Ellison, Executive Assistant, by stimulating the training of high-school students, both boys and girls, in drafting and then assuring employment to all students who would take an extra Saturday-morning training course to speed their work.

Now for the financial side. Several years ago the state highway departments throughout the country were asked to estimate the sums needed to bring their highway systems up to par. After much hard work, the various state highway departments submitted their figures to the Public Roads Administration and the amazing total of $6,218,000,000 was announced. There has been criticism leveled at some states for "going to town" on their estimates and even charges that this was caused by a hope that some day those figures might be used as the basis for a new allotment of Federal-Aid funds. Anyway, the $6,000,000,000 figure has stood for several years now as the volume of construction at which state highway departments would aim in their own plans for contract work as soon as men and materials could be released from their war duties.

The excellent post-war highway program of the American Road Builders' Association, the carefully conceived plan of the American Society of Civil Engineers for post-war construction, and the balanced plan of the Automotive Safety Foundation have all received much publicity and, although differing somewhat in approach and in detailed figures, all prove the fundamental thesis that construction is the basic activity on which our national economy is founded.

The presentation of these plans, with varying formulae for allocation of Federal-Aid funds, to the respective highway committees of the Senate and House of Representatives led finally to the 1944 Federal-Aid Act, aimed to provide by later appropriations $500,000,000 a year of Federal Aid for state and secondary highways, both rural and within urban areas, to be matched equally by the states and available in each of the first three post-war years. This will produce $1,000,000,000 for highway construction per year, augmented by an estimated total of $500,000,000 of construction over a period of years through money of the various states, counties, cities, and towns, as a direct expenditure not matching Federal funds. Thus a total of $1,500,000,000 in Federal funds, an equal matching fund from states, and non-matching local government funds of $500,000,000 are available, making a grand total of $3,500,000,000 for highway construction in the first three post-war years.

Unfortunately, highway construction does not become a fact merely by thinking of funds or talking about projects. Yet, our worry is not the lack of funds, for a large percentage of them is ready to go to work, and the balance can be acquired through loan or bond issues. The great need is completed plans, specifications, and acquired right-of-way so that contracts can be awarded. The large diagram on this page, prepared by the American Road Builders' Association, tells a sad story.

Where Are Your Plans?

On the diagram, the bars extending downward represent the amount of money the states told the Public Roads Administration would be required to bring their state highway systems up to par. They total the more than $6,000,000,000 recorded.

But what of the bars extending upward, what about those black dots, and double circles? Well, the black dots represent the Federal and state money covered by the recent post-war highway act as allocated to the various states and matched by the states. The double circles represent the estimated expenditures in excess of Federal and state matching funds. The bars for California, Connecticut, Delaware, New Jersey, New York, South Carolina, Texas, Vermont, and the District of Columbia have reached or exceed the black dot, indicating that in those states projects were ready for letting as of May 1, 1945, to the extent of the Federal-Aid allotments plus the matching funds. But in altogether too many cases, the black dot as well as the double circle is far above the bar indicating the extent of projects ready.

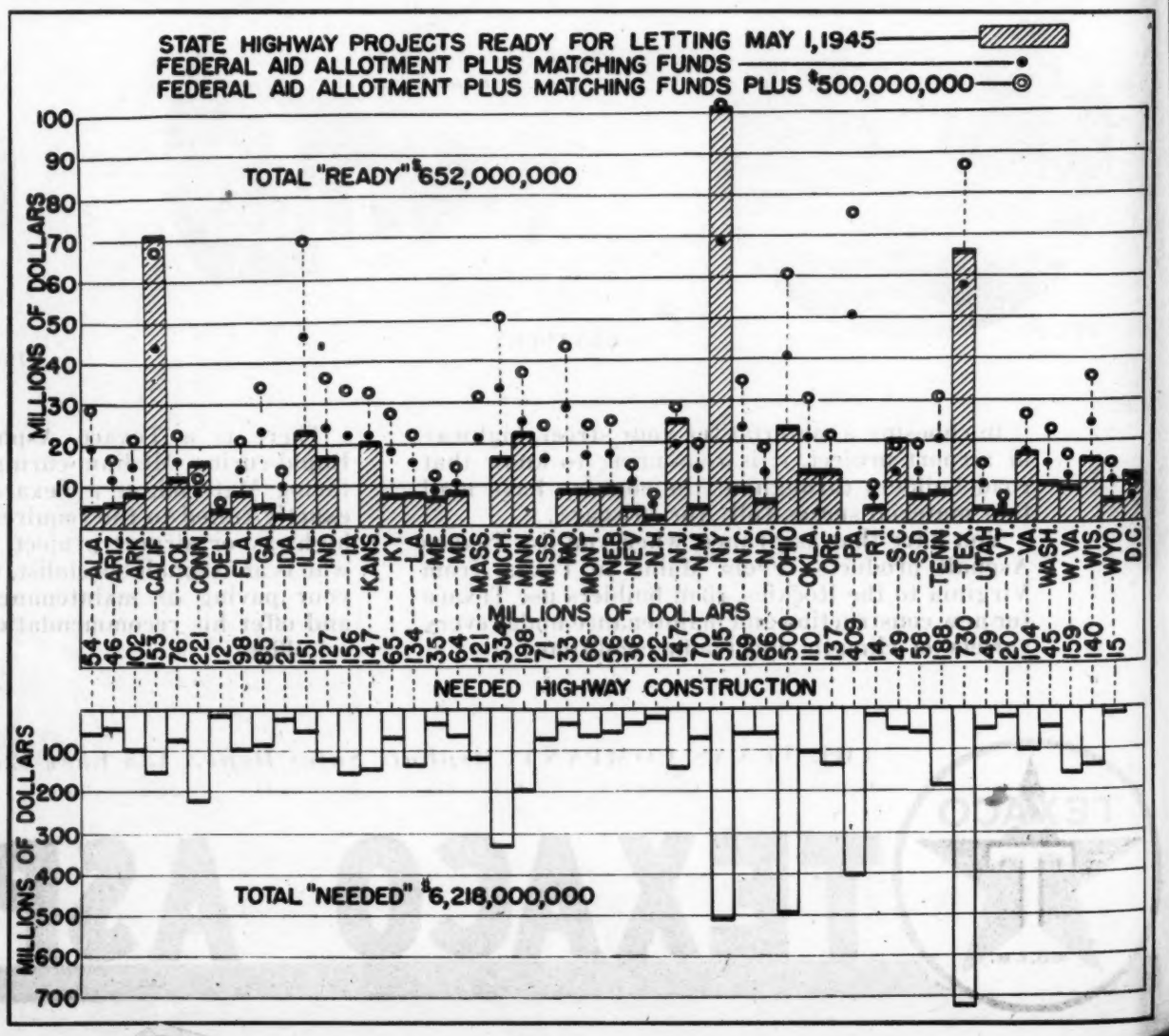
We have talked about this subject in editorials before, including one with that fateful title "Do You Want the War to Continue?". No matter what the political pressure may be, no matter how much stagnation there may be higher up or lower down in your department, highway engineers through all levels of government must buckle down to work immediately and by every means at their command complete the preparation of a sufficient volume of plans to insure that adequate projects will be available. Then when the day arrives which the Congress selects as the beginning of the first post-war year, a full program of highway construction will start.

PAW Bans Road Oil Manufacture in USA

The manufacture of road oils anywhere in the United States has been banned by formally amending Petroleum Administration for War Directive 80, effective June 29, according to Deputy Petroleum Administrator Ralph K. Davies. The amendment became necessary because heavy military demand for residual oil, from which road oils are manufactured, resulted recently in issuance of an order prohibiting the sale or use of such oil for paving or dust-palliative purposes.

Under the amended order the manufacture of eighteen grades of asphalt cements and medium-curing and rapid-curing cut-back asphalts will continue to be permitted.

PLANS READY FOR ONLY ONE-TENTH OF NEEDED HIGHWAY CONSTRUCTION



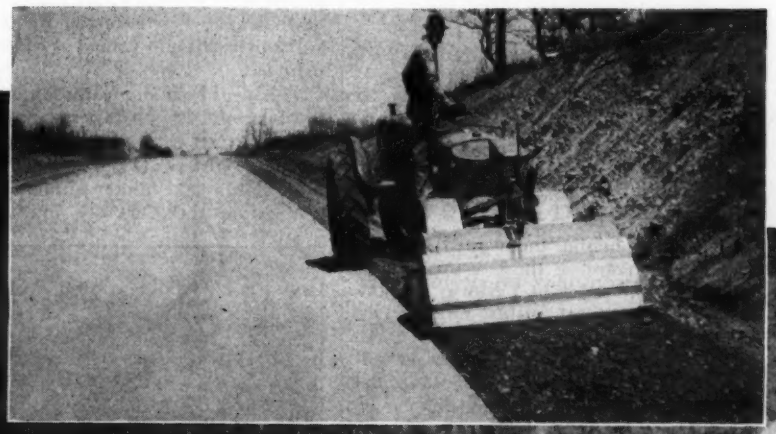
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Airport Access Road Rushed To Completion

Big Horn Const. Co. Speeds 1.5-Mile Grading, Gravel Base, Road-Mix Surface, and Cantilever Retaining Wall

By FRANK B. SARLES,
Western Field Editor

✦ TO expedite a small contract awarded by the Wyoming Highway Department for a 1.539-mile semi-urban access road from Sheridan to the newly enlarged and improved County Airport, the Big Horn Construction Co., Sheridan, Wyo., utilized facilities of its parent company, the contractor for the airport surfacing improvements, and by so doing was able to speed the completion of the grading, gravel base, road-mix, and the construction of a reinforced-concrete retaining wall.

Retaining Wall

One of the more important items on this job was the construction of 434 linear feet of retaining wall adjacent to the road to prevent damage to residential property where a cut was made just outside of the Sheridan city limits. This wall was designed as a cantilever type, with footings from 3 feet 6 inches to 8 feet 6 inches wide and 12 inches to 20 inches thick. The wall's height varies from 4 to 11 feet with the 12-inch wall set from 12 to 30 inches from the toe of the footing and from 18 inches to 4 feet 9 inches from the heel. The footings are reinforced both ways with ½-inch and ⅜-inch round rods at an average spacing of 4 inches. The vertical wall is reinforced with ½-inch and ⅜-inch round rods on both faces, their spacing varying with the height of the wall. The back bars are hooked into the footing.

Rough excavation for the wall was performed by a Caterpillar RD7 and a 12-yard LeTourneau scraper, with final finishing by hand. Soil conditions were such that it was possible to pour the footings without the setting of front or back forms except for the expansion joints at the end of the individual monoliths. Common bricks were used to support the reinforcing steel in the proper position above the bottom of the footing, with a frame of 2 x 6's erected to hold the vertical steel in place.

Both wall and footing were poured with Class A concrete which, under Wyoming specifications, is designed with 660 pounds of combined aggregate per sack of cement, the proportion of fine aggregate varying from 200 to 300 pounds as determined by laboratory tests. This gives an average cement content of five sacks per cubic yard. The design is based on the use of 7½ gallons of water per sack of cement including moisture contained in the aggregate, but field operation is controlled by slump which is held between 2 and 3 inches. Concrete is placed with internal vibration.

The aggregate used was within the following specified gradation:

Sand

Size (Square Opening)	Per Cent Passing
⅜-inch	100
No. 4	95-100
No. 50	5-30
No. 100	0-8

Gravel

Size (Square Opening)	Per Cent Passing
1½-inch	95-100
¾-inch	35-70
⅜-inch	10-30
No. 4	0-5

Aggregates for the concrete were stockpiled at convenient locations, proportioned by weight on Butler wheelbarrow scales, and mixed in a two-sack CMC mixer mounted on a rubber-tired crossway frame. The concrete was mixed for a minimum of 2 minutes after all materials were in the drum. The retaining wall was poured in alternate monolithic sections which averaged 30 feet in length, except where alleys and private entrances necessitated revision. A premolded expansion joint was provided between sections. The men employed in placing the concrete included one shoveler and one wheelbarrow man on the gravel; one man to perform both operations on the sand; one man to dump cement from the cloth sacks into the mixer; one mixer operator; three men rolling away the mixed concrete in rubber-tired wheelbarrows; and three men to assist in dumping the concrete and vibrating it with a gasoline-powered Viber unit. The exposed face of the wall, which was poured against plywood-lined forms, was given a rubbed finish with Carborundum bricks.

Backfilling behind the wall was done with the same pervious gravel used for the embankment. It was mechanically tamped and covered with an 8-inch layer of topsoil selected for its grass-growing qualities.

A double concrete gutter for intersecting streets and alleys was placed by the same organization which poured the retaining wall. This gutter, 6 inches thick and 6 feet and 8 feet wide, was not reinforced and its top section furnishes a 1½-inch depression to carry drainage through the intersections.

Sewers and R/W Fence

In advance of the road grading operations, an 8-inch sanitary and 15-inch and 18-inch storm sewers were installed. A Parsons trencher was used for this excavation and the light pipe was easily laid by hand. Backfilling was done by hand and the material compacted by air-powered tampers. Sectional steel manhole forms were used for the construction of concrete manholes. Both 15 and 18-inch concrete pipe culverts were used to provide cross drainage for surface water.

A change in specifications which casts an interesting sidelight on standard practice in the state of Wyoming was in the reconstruction of right-of-way fences. The usual practice in Wyoming is to build right-of-way fence to a quality at least equal to the existing fence and to place it 1 foot towards the road from the right-of-way line so that it remains definitely under the control of state forces and is not subject to movement by the rancher. Originally this item was bid in Wyoming only by the linear foot, with a 6-foot 6-inch brace panel, consisting of a 4 x 6 horizontal strut between posts plus two diagonal brace-wires, placed at ¼-mile intervals. Standard design calls for 20-foot spacing between posts. However, it was found that fencing placed on the chords of curves required so many additional brace panels with extra posts that it was considered advantageous to allow contractors to bid on individual end panels and brace panels in addition to the price bid per linear foot for straight fence.

Grading

The grading consisted primarily of

(*Continued on page 64*)

Gravel Borrow Pit Now a 3-Acre Lake

The story behind the attractive 3-acre lake to the south of the Greenwich Toll Station on the Merritt Parkway in Connecticut is one of utility and service turned into beauty.

Just to the south of the present toll plaza site at Riversville Road was a flat brush-covered field outlined along its eastern boundary by a deep and vigorous stream. When the landscape engineer on this project dug test pits in the field to determine the depth and quality of the loam, he discovered a fine bed of gravel below the topsoil. Borings indicated that the gravel was available to a depth of 30 feet or more.

The contractor had an insufficient amount of gravel available on his project to bring the roadbed up to grade. The landscape workmen needed more loam than had been salvaged, to cover the existing slopes.

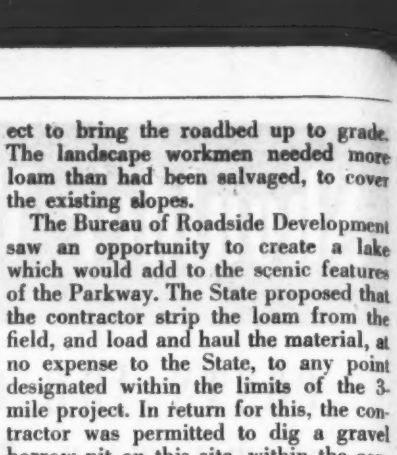
The Bureau of Roadside Development saw an opportunity to create a lake which would add to the scenic features of the Parkway. The State proposed that the contractor strip the loam from the field, and load and haul the material, at no expense to the State, to any point designated within the limits of the 3-mile project. In return for this, the contractor was permitted to dig a gravel borrow pit on this site, within the confines of the proposed lake. He agreed to this because of the great saving in the length of haul from the nearest source of gravel off the job.

Leaving a dike about 20 feet wide between the stream and the borrow pit, the contractor stockpiled the loam as required. Gravel was loaded by shovel directly into trucks for the first 8 feet, after which seepage made it necessary to operate on timber mats. A dragline was used to stack the gravel for draining and ease of handling. The last operation was the removal of the dike, permitting the stream to flow through the 3-acre borrow pit. The slopes were dressed and now nature has taken over. A traveler along the Parkway sees a natural rather than an artificial lake.

The contractor removed approximately 60,000 cubic yards of gravel. The State benefited by securing 16,000 cubic yards of rich loam valued at $1 per yard in place.

The local Fish and Game Club stocked the lake and it is a favored rendezvous for fishermen.

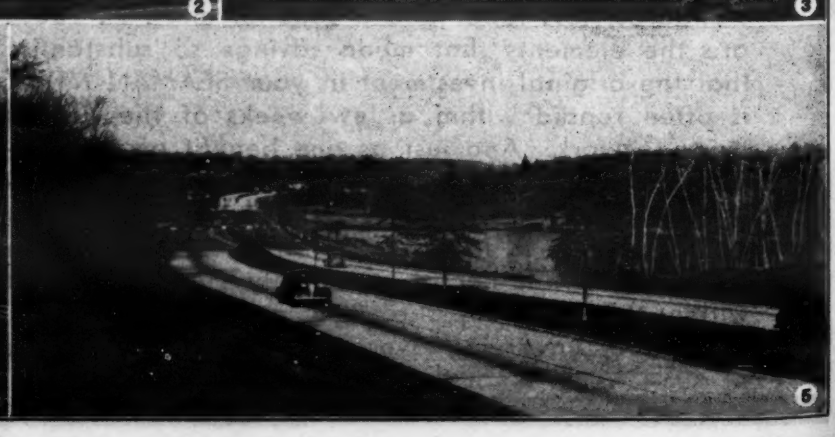
The Highway Department built another large lake under similar circumstances on the Parkway in Stamford.











A "natural" lake in a borrow pit. 1. The first operation by the contractor was stripping from borrow area and stockpiling. 2. The contractor starts excavating gravel with his dragline. A Bucyrus-Erie 37-B shovel loaded the loam from the stockpiles for use along the roadsides. 3. With excavation completed, the lake is starting to fill, the dragline is moving out, and the stockpiles of loam are not yet used up. 4. Grading for the Merritt Parkway alongside the "natural" lake. 5. The same site today as a motorist approaches the Greenwich toll station of the Parkway.

Portraits in Print

By BILL QUIRK

Robert B. Brooks Has Varied Career As Engineer, Builder, and Official

✦ ROBERT B. Brooks, consulting engineer with headquarters in St. Louis, Mo., has worked at three separate careers, any one of which would suffice to satisfy the average business or professional man. This energetic civil engineer, however, has taken them all in stride, and is still devoting part of his working day, or night for that matter, to participation in all three. For Brooks, at various times in his life, has been an international consultant on highway problems, partner in a construction firm specializing in road and municipal sanitation work, and Director of Streets and Sewers of the City of St. Louis. Now his rich experience is solicited by industrial and engineering concerns, while between such engagements he maintains a lively interest in civic affairs.

During a recent interview in his office in the Ambassador Building in downtown St. Louis, "Bob" Brooks, as he is called by almost everyone who knows him, was more inclined to talk about his sons in service than about himself.

"That's Joe, the baby," Brooks remarked with pride, pointing to a picture on his desk of a lieutenant in the Combat Engineers. "Although at 23 we no longer should consider him a baby. The next boy, Ernest, is 27 and he has been a major with an Airborne Task Force but now is in charge of a Transportation Corps battalion, while Bob, Jr., 31, a Lieutenant-Colonel, is Executive Officer for one of our generals running one of the German provinces. All three have been overseas for a long time."

In the first World War, the senior Brooks was a captain in an engineering construction division, and now at 56 looks as rugged as a paratrooper. He is a 200-pounder, 5 feet 10 inches tall, and played basketball and football at Washington University, St. Louis, where he received his degree in civil engineering in 1910. While at college his deep, resonant voice won him a place on the debating team. Brooks now keeps in excellent physical condition with tennis in summer, and handball and swimming at the Missouri Athletic Club in the winter. He is baldish, ruddy faced, has keen blue eyes, wears gold-rimmed glasses, and has a warm, friendly greeting for everyone. His conservative attire is lightened by the inveterate flower fastened to his coat lapel, for horticulture has been a lasting hobby with Brooks. He also wears the small pin indicating membership in the American Society of Civil Engineers, and is Vice President of its St. Louis Section.

Present Work

"A lot of my time is now taken up acting as consultant for various pipeline companies which pipe natural gas from Louisiana to Missouri," said Brooks. "My work is not engineering in the strict sense of the word, but more of coordinating the activities of the pipeline crews with highway construction so that the two operations do not conflict. St. Louis is being supplied with 130,000,000 cubic feet of gas a day delivered through pipes under a pressure of 425 pounds to the square inch, so we have to be certain that other construction activities in the vicinity do not come in contact with the gas lines."

The close association that Brooks has had with contractors and engineers in the middle west makes him especially fitted for coordinating the different interests involved. By anticipating new construction that would affect the pipe lines, he has avoided costly relocations, thereby reducing the engineering budgets of the gas and fuel corporations.

Other work beyond the scope of pure engineering which greatly interests Brooks is acting as arbitrator in lawsuits or labor disputes. He was recently called in as third man in a suit involving the Pennsylvania Turnpike Commission and several earth-moving contractors. During the construction of that expressway in western Pennsylvania the acquisition of the right-of-way lagged behind the construction schedule, causing the contractors to shift their equipment about until land on which they could work was made available. This extra moving of machinery was not anticipated, and therefore not included in the bid prices, so the contractors felt entitled to some redress. Other points of dispute concerned relocation of alignment involving changes in the classification and quantities of bid items. The contractors had a representative at the hearings, as did the Turnpike Commission, and they, together with Brooks in the role of arbitrator, arrived at a settlement satisfactory to both parties.

"The problems arising in that case," said Brooks, "were pretty much the same as those I encountered in a recent labor dispute the St. Louis County Bus Co. had with its drivers. These difficulties are usually problems in engineering economics, and can be solved by using common sense and looking at the situation from the point of view of both sides. There were five arbitrators in that case, and we finally reached decisions on wages, hours and overtime."

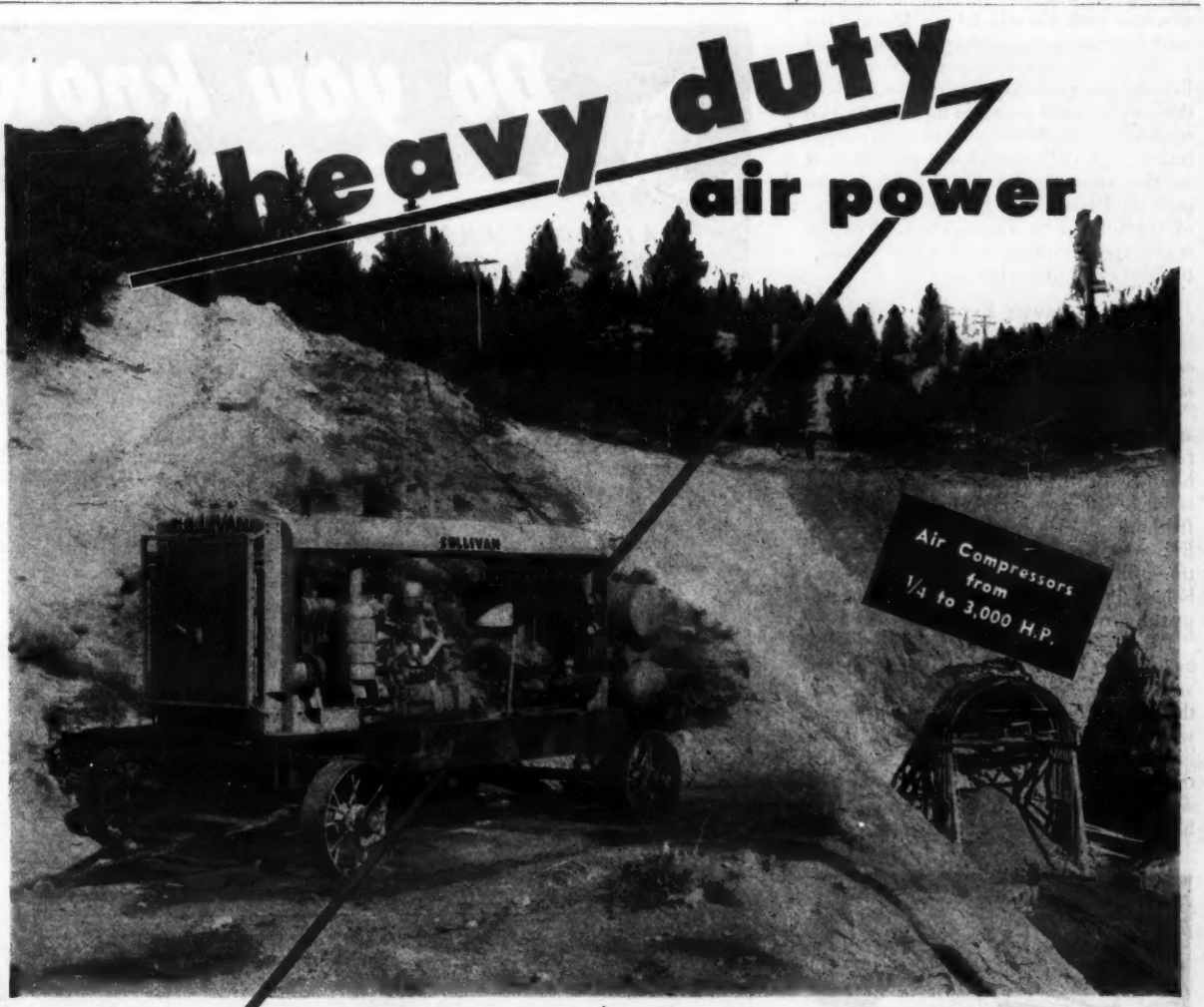
Early Engineering

The wide experience of Robert B. Brooks has well fitted him for the consulting engineering profession. Down in Jackson, Tenn., where he was born, his father taught him to work with his

(*Continued on next page*)



Robert B. Brooks, Consulting Engineer.



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Robert B. Brooks, Consulting Engineer

(*Continued from preceding page*)

hands, and he earned a good portion of his college tuition money by working for the old St. Louis Transit Co. during summer vacations as a laborer, timekeeper, and straw boss. His first job after graduation was with the Frisco Railroad as rodman and was followed by two years as Assistant Engineer in the Sewer Department of the City of St. Louis. Then in 1912 he married, and also ventured into the field of private construction as a partner in the firm of Moreno, Brooks & Burkham, building sewers, water lines and highways in the Mississippi Valley and some eastern states.

World War I gave Brooks an interlude of military construction erecting camps in Texas, Georgia, and Virginia, but after it was over he returned to civil practice with his old firm. During the next few years the mid-west experienced a boom in sewer construction, with Brooks' company getting a good share of the work and employing thirty-two trenching machines on its many contracts. By 1925 this experience resulted in the appointment of Brooks to the post of Director of Streets and Sewers of the City of St. Louis, the first of the many appointments he has had to positions of civic importance.

Sewer Expert

"St. Louis can boast of having the earliest complete sewer system of any large city in the country," said Brooks. "Some of its large mains were constructed with walnut logs serving as a foundation for brick sewers which were bonded with lime mortar, since portland cement did not arrive in this country from Belgium until 1890. One of my first jobs was the replacing of some of these old sewers which lay 40 to 90 feet below the surface of the narrow streets in the downtown business district.

"To reach these sewers by open-cut excavation would have cost $10,000,000 and made a mess of traffic throughout the city. Instead of doing it that way, we used manholes as shafts, took down galvanized-iron liner plates, and used these to handle the dry-weather flow of sewage. Then we cut out the old crumbling sections of brick and wood around the outside with jackhammers, and pumped in a lining of concrete by compressed air. In this way we built an entire new sewer system for $3,000,000 with practically no excavation."

Brooks later served with the St. Louis Board of Public Service and the City Planning Commission in which he still takes an active part. For the past twenty years he has had his own office as consulting engineer. Here, with no staff other than a secretary, he conducts his business which prior to the war had assumed international proportions. The Government of Mexico has consulted with him on highway problems, and in 1941 Brooks gave a series of lectures at the National University of Mexico on types of highways, soil stabilization, and the highways in Europe.

World Traveler

On this last subject he is particularly well informed, having toured Europe in 1931, 1935, and 1938. In the latter year he represented the U. S. Secretary of State at the Eighth International Road Congress at The Hague. During his travels through Germany in 1935 and 1938, he was accompanied by Dr. Fritz Todt, General Inspector of the Reich Autobahnen and one of Germany's leading engineers both in civil and military construction. During his last visit Todt gave Brooks a copy of a monumental work on the Autobahnen entitled "Four Years of Work on Adolf Hitler's Roads". The book contained maps of the German superhighways, complete with contours, topography and other important information which Brooks has since placed at the disposal of our Government.

"In certain respects the Reich Autobahnen have features superior to some of our highways," Brooks commented. "They are built on railroad grades, have paths for pedestrians and cyclists, and show great individuality in their bridge construction. On the other hand, their method of compacting fills was inferior to ours, and their roadway width did not include proper shoulders. This latter disadvantage was felt when they wanted to pull a disabled tank or truck off the road to let others go by."

Opposes MVA

Robert Brooks' observations at close range of the workings of a National Socialist state have aroused in him opposition to the proposed Missouri Valley Authority developed after the pattern of the TVA.

"I had the opportunity to study problems of transportation in Nazi Germany and Fascist Italy," Brooks remarked grimly. "There is a dangerous parallel between such totalitarian ideas as the Tennessee Valley Authority and the Reich Autobahnen system of providing arterial highways for the German Reich, or the Autostrada system for providing roads for Fascist Italy. In these countries, while preliminary estimates and plans were made, no particular attention was paid to staying within estimated costs. Additional appropriations were made on the slightest pretext. Engineering mistakes were covered up and

(*Concluded on page 37*)



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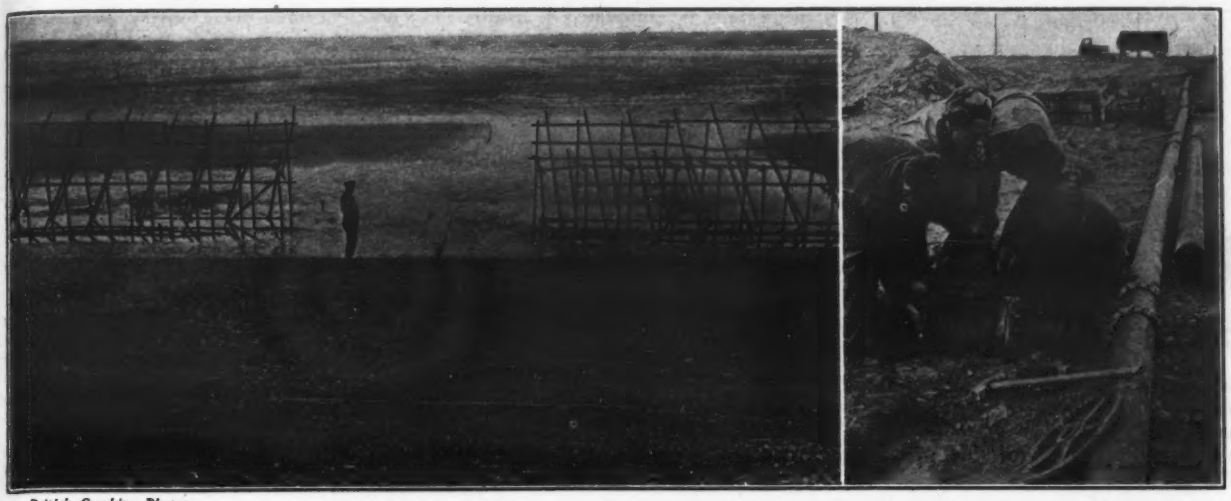


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British Combine Photos

Operation Pluto (Pipe Lines Under the Ocean) is one of the greatest supply stories of the war. At left, an oil supply pipe starts on its way under the English Channel; right, installing a T-union valve on the first line at Boulogne in October, 1944. Pluto supplied 1,000,000 gallons of gasoline and oil daily to Allied armies on the continent.

Under-Channel Pipe Line Story Now Told

Many of the modern engineering miracles which are contributing to total victory are still closely guarded military secrets, but gradually some of the stories of the achievements which made possible Allied victory in Europe are coming to light. One of these is the oil pipe line under the English Channel, conceived by Admiral Lord Louis Mountbatten in April, 1942, and constructed by the British aided by American productive capacity. Twenty 3-inch pipe lines carried oil piped from Liverpool in England to supply Allied armies soon after they landed on the Normandy coast, and were extended as needed to follow our advancing troops.

To American industrial plants which were given the momentous job of adding their productive capacity to that of Britain, the project presented numerous difficulties never before encountered. Among them was the fact that the new line demanded pipes which could withstand pressures of 1,200 pounds per square inch. Because this undersea line was designed to withstand such tremendous internal pressures, new methods of manufacture had to be set up at practically a moment's notice. A. C. Hartley, British engineer, who was instrumental in drawing up the original plans, came to America to collaborate with engineers here in converting their plants and retraining their technicians. Separate shifts worked around the clock, and old machinery was converted, while production was going on, to do new work. Jobs which previously required several weeks to complete were accomplished in a single day.

General Electric Co., Schenectady, N. Y., one of the companies selected to manufacture this heavy-duty pipe, was given a contract for 20 miles of the new pipe on March 3, 1944, and got into production on the project on June 1. Twelve days later, the first shipment was ready to be sent overseas for installation. With more than 25,000 feet of pipe included in each shipment, G-E produced four shipments, the last of which was completed on July 17 in only ten days' time, an average of more than 3,000 feet per day. According to V. A. Sheals, G-E design engineer on the job, a production line of more than 400 feet was finally set up at General Electric. Here workmen and engineers who, because of secrecy orders, did not know on what they were working, aided considerably in accomplishing one of the miracles which are turning the tide of war towards Allied victory.

County Has 3-Year Farm-Road Program

Plans to build approximately 100 miles of paved farm-to-market roads in a 3-year program immediately after the war have been announced by Jefferson County, Ala. The construction program would cost $412,500, of which $300,000 would be supplied from state and Federal sources.

This program is based on the proposal that during the first year the State and Federal governments will distribute $2,500,000 equally among the 67 counties of the state. This money will be allocated on a population and mileage basis, through which Jefferson County will receive $75,000 to which it would add an appropriation of $37,500 the first year. Similar appropriations will be made during the next two years when the County will receive $225,000.

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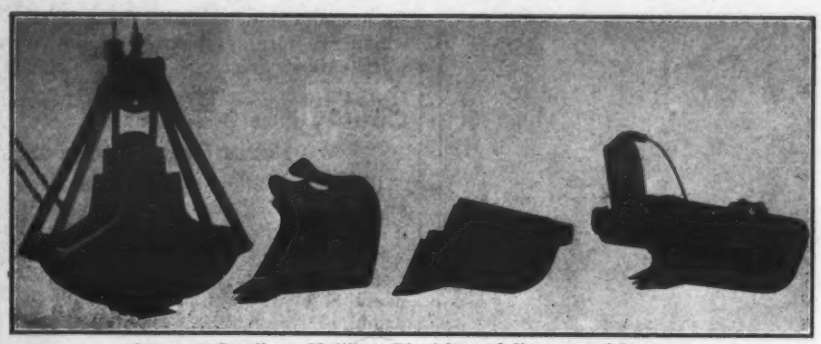
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New Line of Dippers, Clam, Dragline, Shovel

A new Big 4 line of material-handling dippers and buckets has been announced by Pettibone Mulliken Corp., 4700 West Division St., Chicago 51, Ill. For many years this firm manufactured large-size welded dippers and for the past few years has produced welded dippers in sizes down to ⅜-yard capacity.

At present, practically the entire production of these items is going to the armed services with top priorities, but a limited output still is available for the domestic market. After the war, popular sizes will be stocked through material-handling-equipment dealers in all parts of the country. Interchangeable teeth on ½ and ¾-yard sizes of all the buckets except the clamshell are a feature of the new line.

For complete information, including sizes and prices, write direct to the manufacturer and mention this illustrated news item.

Airport Construction Program Needs Funds

D. W. Winkelman, well known contractor of Syracuse, N. Y., who is Chairman of the Airways Facilities Committee of the Associated General Contractors of America, recently told the House Commerce Committee in Washington, at its hearings on legislation providing for Federal aid in the development and construction of a national airport system, that prompt action should be taken on the proposed national airport program and that funds should be made available immediately for the preparation of airport plans.

"The need for prompt action was pointed out by Secretary of Commerce Wallace in these hearings when he said it would take a year and a half to handle the preliminaries necessary to start construction of this program on a national scale," Mr. Winkelman stated. "Congress, in three different acts, has provided funds to be available immediately for planning of post-war highway construction projects. It is even more necessary that similar provisions be made for the post-war airport program.

"Airports are a type of construction which can be undertaken immediately after the war, if plans are ready. The grading and paving of runways do not use scarce materials. If the construction industry is to operate at a high rate of activity, particularly in the period immediately following the end of the war, it must depend in this period on such type of projects as airports, where there is no shortage of material.

"Some types of construction, particularly for buildings which will require such things as finished hardware, air-conditioning equipment and other facilities, cannot be completed as readily immediately after the war as can airport construction.

"Further, as men are discharged from the armed forces, there will be many from the Corps of Engineers and Seabees who will have had extensive war training in the earth-moving and paving operations which constitute airport construction.

"Although there is considerable difference between doing the grading and paving of a runway under battlefront conditions, where the only objective is to get the job done quickly, and executing work most economically under peacetime conditions, there are thousands of men in the Engineers and Seabees who are acquiring new skills and sharpening old ones who can be given peacetime jobs in the airport construction program.

"Development of the airports will also stimulate many other industries, and stimulate work opportunities not only in those industries which will provide materials for the construction work, but also in industries making use of the completed airports.

"The public expenditures on these airports will not only provide work opportunities, but will stimulate private investment, with its consequent increase in work opportunities."

Dual-Action Screed

A vibratory finishing screed, said to provide accurate strike-off and compaction of concrete in one single operation, is the feature of a new 4-page folder just issued by the Master Vibrator Co., 100 Davis Ave., Dayton 1, Ohio. An airport concreting job where this piece of equipment was used is described in detail as an illustration of the speed, economy, and accuracy of this finisher. Photographs and charts are included in the folder.

Copies of this folder are available to highway engineers and contractors who write direct to the company requesting Form MV-710 and mentioning this review.



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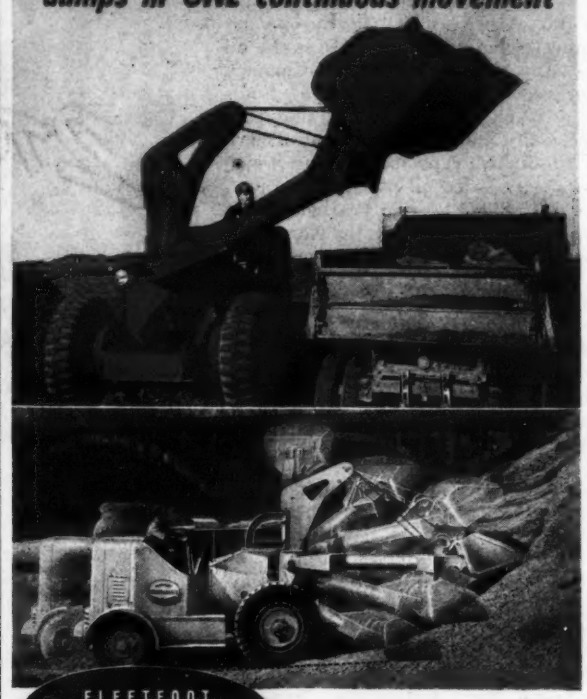
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Asphalt Plant-Mix Laid On Sand-Clay Base Adjoins Runways at Navy Field; Runways Improved

By WILLIAM H. QUIRK,
Eastern Field Editor

✦ BARIN Field, a U. S. Naval Auxiliary Air Station located 4 miles from Foley in southeastern Alabama, had experienced serious erosion in the area adjoining the runways at the eastern end of the field. Heavy rains running off the eastern side of the 6-inch sand-asphalt runways had washed away the abutting soil, undermining the slab, and forming cracks in the unsupported areas which later resulted in breaks, thereby reducing the effective width of the 300-foot runways and making the edge irregular.

To correct this condition, the Bureau of Yards and Docks, Navy Department, at Washington, awarded a contract to the Noonan Construction Co. of Pensacola, Fla., to grade the badly eroded area along the eastern side of two runways, and to construct a paved ditch or apron, 80 feet wide, adjoining them. This wide apron carries the surface water to concrete pipes which conduct it far beyond the limits of the field, preventing further erosion.

The Noonan Construction Co. did the grading and laid the drainage pipe, but gave a subcontract to the Smith Engineering & Construction Co., also of Pensacola, to lay the sand-clay base for the apron which was topped with a hot asphalt plant-mix. The Smith organization also built a 300-foot dike of hot-mix to prevent water running off the runway pavement at the southeast end of the field and causing similar soil erosion. This dike diverts the water into the apron ditch where it runs off into the culvert pipes.

Grading

The drainage ditch is in the shape of an irregular V, with the side adjoining the runway 50 feet wide and dropping down to a point about 2 feet below the runway grade. The other leg of the V is 30 feet wide and slopes upward from the invert to ground level. One section of this ditch running almost due north and south is 1,271 feet long and has a pitch from both ends to a drainage structure at the center. From the northern end of this section, 800 feet of drainage ditch, of similar design, has been built alongside a runway almost at right angles to the north-south ditch. This ditch slopes to a drainage structure at the eastern end. Another 300-foot ditch at the east end of the east-west runway completes the system.

Excavation for this storm-drainage system totaled 13,000 cubic yards, and was done by two LeTourneau 8-yard Carryall scrapers pulled by Caterpillar RD7 tractors. The average haul was about 600 feet to low-lying eroded areas beyond the runway shoulders where the spoil was wasted to good advantage. Along with the excavation, about 3,500 feet of concrete culvert pipe was laid, in sizes from 18 to 48 inches, to carry the storm water from the drainage ditch away from the field.

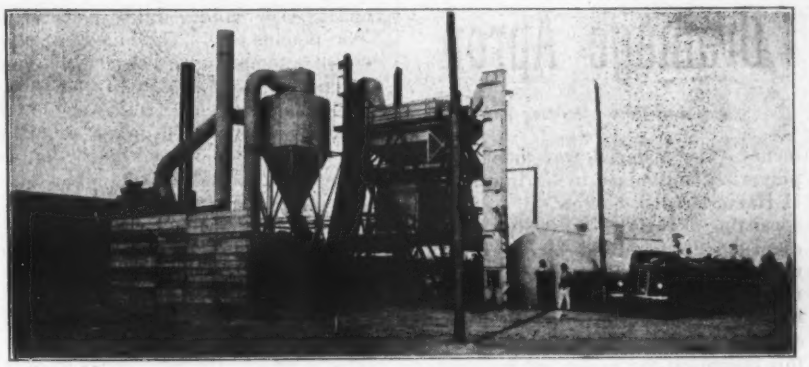
Sand-Clay Base of Ditch

The bottom of the drainage ditch consists of a 3-inch compacted layer of sand-clay. A total of 3,400 cubic yards of this material was excavated from a borrow pit by a Lorain 40 dragline with a 35-foot boom and a ¾-yard bucket, and hauled 1½ miles to the field in four Mack 4-yard dump trucks. The material was dumped in three rows spaced 26 feet 8 inches apart running down the 80-foot width of ditch, with a pile every 10 feet along the length of the ditch. This sand-clay is a natural material consisting largely of a mixture of sand and clay with all the material passing the 10-mesh sieve and proportioned about as follows:

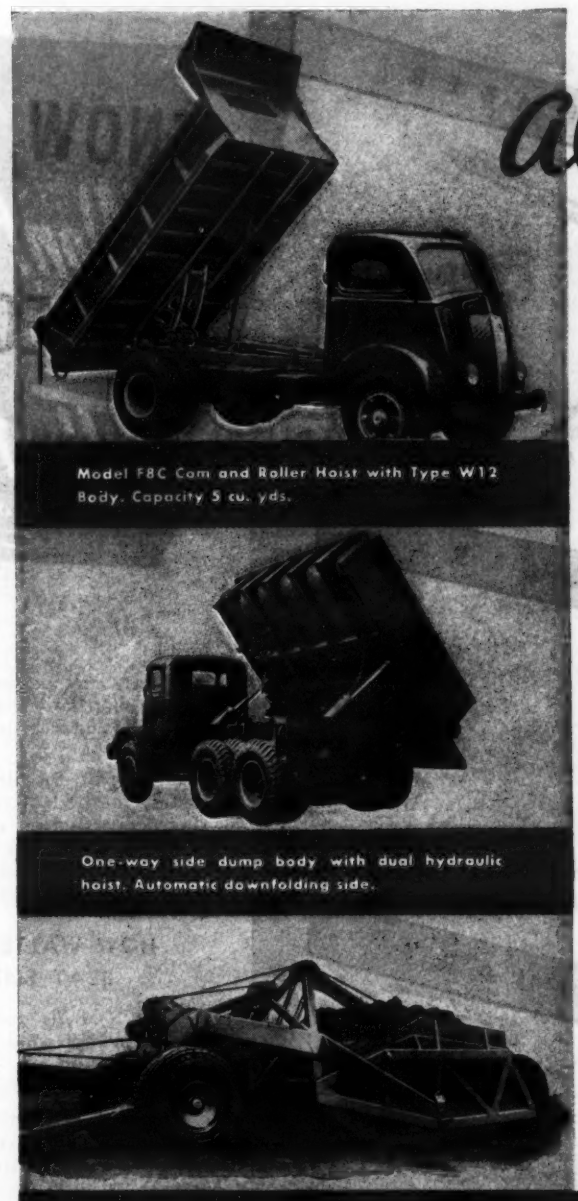
Clay	9 to 18 per cent
Silt	0 to 15 per cent
Total sand	65 to 80 per cent
Total sand retained on 60-mesh sieve	45 to 60 per cent

These piles were knocked down by an Adams power grader with a 12-foot blade and spread to a loose depth of 5

(*Continued on next page*)



C. & E. M. Photo
Smith Engineering & Construction Co. set up a Cedarapids asphalt plant at Canal Field, Ala., for hot-mix paving at both Canal and Barin Fields of the U. S. Navy.



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White Mfg. Co.

ELKHART INDIANA

Drainage Apron

(*Continued from preceding page*)

inches. The material was then further pulverized and mixed by an International Harvester disk harrow, 10 feet wide, consisting of two rows of twelve 22-inch-diameter disks pulled by an International TD-40 crawler tractor. Several round trips with the harrow mixed the base thoroughly, after which it was bladed to grade by the Adams grader. In this operation the power grader started from the runway pavement with a small roll of material at the bottom of the blade and worked down one slope to the invert and then up the other side. Then the grader was turned around and the operation reversed back to the runway again. In this manner all the excess material was worked into the base.

Then the base was compacted by a Bros wobble-wheel rubber-tire roller which gave it a hard surface. The position of the blade on the grader was then changed from the perpendicular to a backward tilt of almost 45 degrees and the surface worked over again. This operation hard-planed the surface and removed excess loose material. The depth of material was reduced from 5 to 3 inches by this manipulation. Sufficient precipitation fell during this phase of the work to keep the material at optimum moisture content for maximum compaction; otherwise water would have been added. A violent rainstorm did occur one night, just after the base had been prepared, pouring off the runway and ruining the contractor's work. The base was done over but this time precautions were taken to avoid a reoccurrence by installing a protective dike of sand bags along the edge of the runway to stop the rush of water in case of heavy rain. The dike was formed in the shape of a pyramid with two bags on the bottom and one on top for the length of the ditch.

Prime Coat

The completed base was primed with RT-3 tar of 13-22 viscosity at the rate of 0.25 gallon to the square yard, at a temperature of 120 to 130 degrees F, by an Etnyre 700-gallon pressure distributor with a 20-foot spray bar, mounted on a Mack truck. The tar was supplied by the Reilly Tar & Chemical Corp. from Mobile, Ala., and hauled the 30 miles to the job in a 4,145-gallon Fruehauf tank trailer pulled by a Mack truck-tractor. The tar was delivered at a temperature between 75 and 100 degrees F, was loaded into the distributor by its own pump, and heated to the required temperature by the torch on the Etnyre.

The prime coat penetrated the base for about 1 inch and thoroughly waterproofed it. Ten days were allowed for curing, after which the 3-inch hot-mix sand-asphalt pavement was laid.

Hot-Mix Pavement

An asphalt plant was set up at Canal Field, another Navy field also in Alabama, and about 9½ miles from Barin Field, since some extensive hot-mix paving operations were scheduled for the former site. The mix was hauled from Canal to Barin Field in five Mack 4-yard trucks, each holding two batches of 3,000 pounds each. The mix was delivered at a temperature between 275 and 300 degrees F to a Barber-Greene Tamping-Leveling-Finisher, which laid the hot-mix in 10-foot lanes to a loose depth of 4 inches. This compacted under the rolling of a Buffalo-Springfield 10-ton tandem roller to the required 3 inches.

A crew of about 30 men was used in the laying of the sand-clay base and the hot-mix top. It consisted of a foreman, a dragline operator, a power-grader operator, 2 tractor operators, 5 truck drivers, a distributor operator, a roller operator, 2 men on the bituminous finisher, rakers, shovelers, and lute men. The latter filled in any holes, using a drag straight-edge with a 12-foot handle, on the end of which was a 1 x 6-inch board, 30 inches long, beveled on the side towards the operator so that when it was pulled over the paving it would not plow into the hot-mix. These men also worked the hot-mix well under the edges of the slab where it had been left unsupported by the erosion.

Dike

The 300-foot dike tying in to the drainage ditch at the southern end to prevent storm water eroding the ground along the runway was built with asphalt hot-mix. Trucks dumped the material in piles every 15 feet along the line of the dike, and were followed by the Adams power grader which knocked the material over by blading along first one side of the row and then the other, using a tilted blade. Then the grader straddled the windrow of hot-mix and bladed along the top. The resulting section is 8 feet wide at the base and has an elevation of 1½ feet with a 2-foot flat crown, the corners of which are rounded off. The side slopes are about 2 on 1. Several round trips of the grader along the sides and top of the windrow were necessary before a smooth-appearing dike was achieved.

Sand and Asphalt Materials

A 12-acre plot of ground was purchased by the Smith Engineering & Construction Co. about 4 miles from the asphalt plant at Canal Field, from which sand was taken for the hot-mix paving operations at both Canal and Barin Fields. This local sand, which is the only aggregate in the sand-asphalt hot-

(*Continued on next page*)



"Now this time keep your head down and your eye on the stake."



Snow is no respecter of delivery dates. It may strike while you're waiting for equipment ordered "too late." Play it safe. Get your orders in early and be ready for the first blizzard.

Send today for details on Walter Snow Fighters—the fastest method of snow removal. Study their engineering, their construction details, their record in other highway departments. Work with Walter snow removal experts in planning your program. A headstart now means fewer headaches next winter!

HOW WALTER 250 H.P. SNOW FIGHTERS BEAT BLIZZARDS TO THE PUNCH!

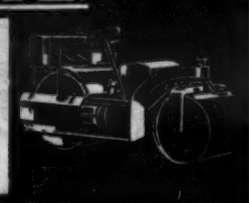
- Clear a 28 ft. width in one run—have rugged power to smash through road-blocking drifts, plus speed to clear more miles per hour.
- Throw snow far to the side—makes widening-out easier.
- Power is not wasted in slipping, stalling or wheel-spinning because the exclusive Walter 4-Point Positive Drive delivers power to FOUR driving wheels according to their traction at any instant.
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WALTER MOTOR TRUCK CO., 1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

Let Last Winter's Lesson be Next Winter's Warning!

Order WALTER SNOW FIGHTERS

C.H.&E. CONSTRUCTION EQUIPMENT



Three Ton Tandem Roller

For patch work. Operates same as automobile, steer forward and reverse speed, controlled by one hand lever. Skin front and rear rolls can be filled with water. Easy to load on a truck for transportation from job to job.

Write for Bulletin 3810 W. Palmer St.

C. H. & E. Manufacturing Co.

Drainage Apron

(*Continued from preceding page*)

mix, met the following gradation requirements:

Passing	Per Cent
No. 10 sieve	100
No. 40 sieve	85
No. 80 sieve	30-35
No. 200 sieve	10

The sand was excavated from this pit to a depth of 4½ to 5 feet by a Bucyrus-Erie 10B dragline with a 35-foot boom and a ⅜-yard Bucyrus-Erie bucket, and hauled to the plant in five Mack 6-yard trucks.

At the plant a U-shaped bulkhead was built, against which the material was stockpiled. This bulkhead was 50 feet long x 12 feet high made from 2 x 8 boards nailed horizontally to 8 x 8-inch posts set on 5-foot centers. As the trucks dumped their loads of sand in this area, a Caterpillar D8 tractor with bulldozer pushed the material up against the bulkhead. Located in a center position, on the stockpile side of the bulkhead, a Bucyrus-Erie crane with a 30-foot boom and a ¾-yard clamshell bucket fed the sand to the feed hopper which had a capacity of 3 tons.

The asphalt used in this mix was AC-6, with a penetration of 50 to 60, and came from Destrehan, La., in tank cars to the L & N Railroad siding where it was transferred for transportation to the plant in a Fruehauf 4,145-gallon tank trailer. A boiler at the siding heated the asphalt to about 300 to 325 degrees F before a Roper pump transferred it to the trailer. At the plant the asphalt was pumped from the trailer into a horizontal cylindrical tank holding 21,800 gallons by a Kinney pump located alongside the tank. There was also a 16,000-gallon fuel-oil tank at the plant.

The Asphalt Plant

The Cedarapids plant, which is moved about from job to job on trailer trucks, was set up in five days at the northwest corner of Canal Field. The horizontal boiler is fired by fuel oil atomized by steam through a jet and furnishes heat for the asphalt tank and the jacketed steam lines, and steam for the rams on the pugmill discharge gates.

From the bottom of the cold hopper the sand was raised by a 15-foot bucket-type cold elevator to a 24-foot x 5-foot-diameter single-drum drier heated by a Hauck steam-jet-type burner. Before the sand entered the drier, the dust was drawn off by a Whirlwind dust collector, operated by a squirrel-cage motor, and chuted down to the bottom of the hot elevator; otherwise the fines would all be blown out of the sand and would be lost to the mix. The dried sand and the fines were carried up a 40-foot enclosed hot elevator to 3 x 10-foot flat vibrating screens, set up in two decks of three screens each. The only screen used, however, was the ¼-inch size which kept roots, stones, etc., out of the sand.

The same Kinney pump that transferred the asphalt from the trucks to the asphalt storage tank also pumped the asphalt through steam-jacketed pipes to the weigh bucket above the pugmill. A by-pass valve on top of the asphalt tank eliminated the complete loop generally used in feeding asphalt to the pugmill.

Power was furnished to the plant by two Caterpillar 13,000 diesel engines, one of which drove an Electric Machinery Mfg. Co. 75-kw generator which supplied power for operating the drier; the asphalt pump; the dust-collector fan; two fuel feed motors, one for the drier and the other for the boiler; and two other motors to pump water from a well to the boiler. The other diesel drove an Allis-Chalmers 90-kw generator which supplied power for the pugmill, the shaker screen, and the hot and cold-elevator motors.

From the screens the sand dropped into a 3-ton bin from where it was fed into the weighing batcher. Kron dial scales weighed out 2,835 pounds of sand and 165 pounds of asphalt for the 1½-ton pugmill where they were mixed for 1½ minutes before the batch was dumped into the waiting trucks. This plant has a rated capacity of 75 tons an hour, but in the comparatively small volume of hot-mix paving at Barin Field no production figures can be cited that would have any true meaning.

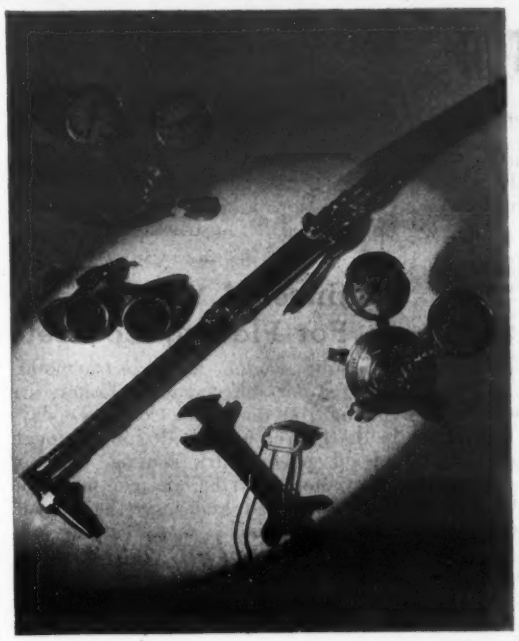
Auxiliary equipment at the plant included four gasoline tanks of 275-gallon capacity which furnished fuel for the trucks, bituminous finisher, roller, etc., and a Hobart electric welder driven by a Ford V-8 engine.

The asphalt-plant crew of fourteen consisted of the plant foreman, plant operator, drier operator, boiler man, dragline operator, tractor-dozer operator, two mechanics, and six laborers.

Quantities and Personnel

This contract, NOY 9182, for soil-

(*Concluded on next page*)



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Ad 104

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N. G. HILL
N. G. Hill & Co., Contractors
Phoenix, Arizona

"...four years ago, after we purchased a fleet of Chevrolet trucks for a road construction job on Highway 77, we were induced to try Ring-Free Motor Oil.

...the test was a tough one due to weather conditions...heavy snow and rain in winter...heat and dust storms in summer.

...during all this time we did not pull a head or pan in any of the trucks except one damaged by striking a huge boulder.

...after the job was completed we removed heads and pans on all motors which had from 50,000 to 60,000 motor miles.

...all compression rings were free...all drain holes in oil rings open...also drain back holes in pistons completely open and no carbon on the under side of the pistons. Cylinder heads and valves were also clean and all valve stems free in the guides. Engine pans and oil pump screens were cleaner than we expected...all bearings were in good shape.

...we now use Ring-Free exclusively in all our equipment*...we recommend Ring-Free Motor Oil to other contractors."

* *36 Trucks—Fords, Chevrolets, Internationals; 6 A.C. Tractors, Diesel powered. 1 D-8 Caterpillar; 3 Graders—2 powered by International and 1 by Caterpillar motor; 1 International T.D-40 Tractor; 1 Lorraine 40—¾ cubic yard power shovel; 3 Light Plants powered by Kohler motors; 1 Gravel plant powered by 6800 Caterpillar Diesel. Also numerous pick-ups and station wagons.*

Operators of all types of equipment report lower-cost, more efficient performance with Ring-Free Motor Oil. Find out how Ring-Free can help lick your toughest lubrication problems...Phone or write the nearest Macmillan office.

MACMILLAN RING-FREE MOTOR OIL

MACMILLAN PETROLEUM CORPORATION

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Drainage Apron

(*Continued from preceding page*)

erosion control and storm-drainage system at the U. S. Naval Auxiliary Air Station Barin Field included the following major items:

Excavation	8,400 cu. yds.
Sand-clay base material	2,500 cu. yds.
Tar prime	4,000 gals.
Hot-mix	3,800 tons
Asphalt, in mix	35,600 gals.
Asphalt, seal coat	6,000 gals.
Concrete pipe, 18-inch	100 ft.
Concrete pipe, 36-inch	710 ft.
Concrete pipe, 40-inch	900 ft.
Concrete pipe, 48-inch	1,800 ft.

Work was started on the grading and drainage in September, 1944, and was completed by the end of the year. The sand-clay base and the hot-mix top were constructed during January, 1945. The contract price for the entire project was $68,000, of which $22,000 was for the sand-clay base and hot-mix laid by the Smith Engineering & Construction Co., and the remainder for the grading and drainage done by the Noonan Construction Co.

Lieut.-Commander Tom R. Johnson was Resident Officer at Barin Field in charge of construction, while Rufus Hammond was Superintendent and Jack King was Construction Engineer for the Smith Co.

Canal Field Contract

Another contract which was started February 1, 1945, by the Smith Engineering & Construction Co. was for the repair and resurfacing of the paving at Canal Field, also near Foley, Ala. This contract, NOY 10087, of $170,000 included 45,000 tons of hot-mix paving.

Canal Field, as the name indicates, is located on low ground not far from a canal and is not an ideal site for an airfield (See C. & E. M., July, 1944, page 25). The soil has an excess of clay, and during the construction of the sand-asphalt mixed-in-place runways with Wood Roadmixers in the autumn of 1942 the soil was saturated with water from heavy rains. The field has three runways, 3,600 feet long x 300 feet wide, built to a 6-inch depth of asphalt mixed with the existing soil. To help storm drainage on the field, the Navy dug a ditch 3½ feet deep three-quarters of the way around the field which has improved the condition of the soil. The paving, however, cracked in many places and broke up over small areas. The Navy subjected the field to tests with a trailer loaded to equal the weight of a plane and more cracks developed.

The failed areas were broken up by scarifying with an Adams grader and then all the broken material was removed by a LeTourneau 8-yard scraper pulled by a Caterpillar D7 tractor. Smaller patches were cleaned out by hand. These areas then received a seal coat of RC-1 asphalt applied by the distributor at the rate of 0.25 gallon to the square yard. The holes were filled to the surrounding grade with hot-mix laid by the Barber-Greene bituminous finisher.

Instead of improving the entire 300-foot width of runways, only the middle 200 feet was improved, leaving a 50-foot strip on each side to serve as a shoulder. This 200-foot width then was given a light tack coat of RC-2 asphalt at the rate of 0.10 gallon to the square yard. Hot-mix, in the same proportions as that used on Barin Field, was then laid in two courses, a leveling course and a 1½-inch minimum top course over the 200-foot central strip. The maximum haul of material was 3,600 feet and the paving was done in twenty lanes 10 feet wide, running down one lane and back the adjoining one. Initial rolling was done by a Buffalo-Springfield 5-ton tandem roller which kept within 6 inches of the edge of each lane so that when the next lane was paved the entire joint could be rolled, thereby avoiding the formation of a bead at the joint. The compacted thickness of the two courses averaged 2½ inches. Final cross rolling over the entire runway width was done at 45 degrees by a Buffalo-Springfield 10-ton tandem roller.

Lt. (j.g.) Samuel H. Zimmerman was Resident Officer at Canal Field in charge of construction, while Jack King was Construction Engineer for the Smith Engineering & Construction Co.

Engineered Vibrators For Placing Concrete

Gasoline-engine and electric-motor-powered portable concrete vibrators are coming from the Pacific Coast these days in the Dreyer units built for the tough job of placing dry concrete without honeycomb. In the electric unit, the Dreyer-designed high-speed motor will operate continuously under varying voltages, in the nominal 110-volt range, without brush or commutator troubles, according to the manufacturer. All sizes of flexible shafts, casings, and vibrator heads are completely interchangeable with each other, and can be used on the electric or gasoline-powered unit.

The power unit for the gas-engine-driven vibrator is a 4-hp single-cylinder air-cooled engine with a built-in centrifugal clutch. This automatic clutch of the oversize-brake-shoe type is mounted on ball bearings. The standard 360-degree swivel-base mounting allows a wide range of use without changing the position of the motor base. This swivel-base unit is also furnished with a wheelbarrow mounting.

The standard 2½-inch-outside-diameter vibrator head, which is generally used as an all-purpose vibrator, will efficiently vibrate walls from 8 inches up and does satisfactory work on slabs and in footings. The 1¾-inch vibrator head is used in walls under 8 inches thick, for walls or columns which are heavily reinforced, and for precast piling. The 3-inch-outside-diameter vibrator head is used in mass concrete or very heavy members. Shaft extensions are furnished to increase the standard working length of 15½ feet to a maximum of 30.

A folder giving a complete description of these vibrators, with illustrations and diagrams, may be secured direct from the Dreyer Vibrator Co., 619 E. Third St., Los Angeles, Calif.

More "E" Awards

Announcement has been made of the award to Bay City Shovels, Inc., Bay City, Mich., of the Army-Navy "E" for excellence in production.

Kewanee Boiler Corp., Kewanee, Ill., has received its fifth "E" Award, the first of which was made in August, 1942.

A third star has been added to the Army-Navy "E" pennant at the works of the Macwhyte Co., Kenosha, Wis., manufacturer of wire rope, for sustained excellence in production.

The Rockford Division of Borg-Warner, at Rockford, Ill., has been awarded the Army-Navy "E" for the fourth time. For more than two years this organization was sole supplier of clutches for Army medium tanks.

DOLLARS DOWN TO EARTH



BUDGET-SAVERS—these Blue Brutes! When postwar construction plans come down to earth, they'll keep down costs on jobs like this:

Pittsburgh's $36,000,000 public works program including $4,719,550 for water mains, $9,142,500 for streets, $3,494,000 for sewers.

Other cities, too, have made substantial plans. Blue Brute air-power teams will back your effort then — and they'll help you, right now, on those jobs that call for sure power, free from time-wasting trouble.

Compressors, like the 210′ model shown above . . . Diesel, gasoline or electric driven . . . all have Feather* Valves — strongest, lightest, tightest, *proved* good for a lifetime — 3-point suspension of engine and compressor for rigid alignment — full force feed lubrication — and other trouble-savers.

Air tools — clay diggers, sheeting drivers, paving breakers — tools for *every* construction purpose — are better designed for sturdier, smoother action, easier handling!

Look 'em over now; plan now to get more worth from air with Worthington. Your nearest Blue Brute distributor is listed on page 15.

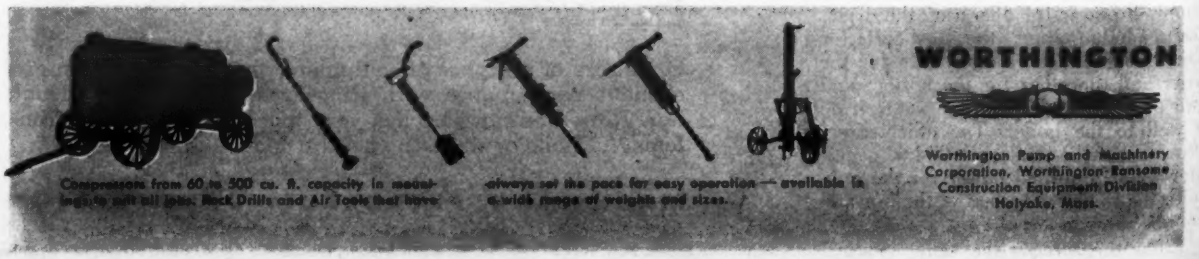
*Reg. U. S. Pat. Off. NS-1

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Essential LST's for amphibious war are speeded through production in a famous shipyard with the help of round-the-clock Blue Brute air-power. Also at work in hundreds of Army camps, Navy yards, air bases . . . here at home and on fighting fronts.

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES



Control Is Relaxed Over Construction

The first step in the relaxation of control over construction activities, effected by Order L-41 as amended, was recently announced by the War Production Board. The chief changes made by the amended order are the raising of the annual dollar-value limits on various types of construction which may be undertaken without WPB authorization, and expansion of other exemptions permitting certain types of construction jobs without WPB authorization and without regard to the annual cost limits. One of the most important of the new exemptions is preliminary earth-moving operations, provided that no lumber or other construction materials except drainage pipe and culverts are required.

In the category of work restricted by its dollar value, most of the provisions affect building construction more than heavy-construction projects. However, under the amendment, canal, storm sewer, dam, levee, jetty or retaining-wall jobs needed for shore protection, up to $10,000 in cost, may be undertaken without authorization, and bridges, over or underpasses, docks, piers, and airports up to $25,000. The limit on the latter category has been $1,000.

The most important liberalization is that allowing grading, ditch digging or similar earth-moving operations, which will permit initiation of work on highways, airports, and other types of projects, WPB officials pointed out.

In a statement explaining why controls on construction cannot be lifted completely at this time, John L. Haynes, Director of WPB's Construction Bureau, said:

"The construction industry is one of the largest potential users of resources and one of the largest potential employers of man-power. It is therefore a key industry in the partial reconversion made possible by V-E Day, and as such it should operate under as much freedom as possible. . . . Controls will be relaxed just as soon as resources become available, but relaxation will have to be gradual. Some general controls over construction must be retained to assure completion of essential projects and to prevent the drain of resources from war production and essential construction to less essential projects.

"Under the new version of Order L-41, small industrial and commercial structures and certain other types of projects important to the civilian economy may be undertaken without specific WPB authorization. Major construction projects for which WPB authorization is required must still be justified as essential to war production, or to public health and safety and critical civilian needs. In addition, some reconversion projects that will contribute to employment when full-scale reconversion is possible will be authorized."

New Truck-Engine Bulletin

The latest bulletin on the Hall-Scott Series 400 truck engines has just been issued by the Hall-Scott Motor Car Co., 2850 7th St., Berkeley 2, Calif. In addition to a discussion of the features of these engines, which include simplicity of design, ruggedness, and great power at low revolutions with properly selected gear ratios, the bulletin contains a number of sectional views of the Series 400, photographs of various types of hauling units equipped with Hall-Scott engines, and condensed specifications.

Copies of this new bulletin are yours for the asking. Just address your request to the manufacturer and mention this brief review.

Mileage Reduction Saves Gasoline, Tires, and Cars

State governments have estimated that their mileage-reduction programs in 1944 saved 28,683,000 gallons of gasoline, 78,228 tires, and 7,171 new passenger vehicles. From OPA information, the Council of State Governments reported that states saved 430,254,000 miles of official travel last year, as compared with state mileage figures for 1941, the last pre-war year.

Worthington-Ransome Blue Brute Distributors

By referring to the advertisement on page 14, you'll learn the meaning of the (1), (2) or (1-2) beside their names.

Ala., Birmingham (1) J. D. Pittman Tractor Co.
Ariz., Phoenix (2) Smith Booth Usher Co.
Ark., Fort Smith (2) R. A. Young & Son
Little Rock (1) Kern-Limerick, Inc.
Little Rock (2) R. A. Young & Son
Calif., Los Angeles (1) Garlinghouse Bros.
Los Angeles (2) Smith Booth Usher Co.
San Francisco (2) Coast Equipment Co.
Colo., Denver (2) John N. Meade
Denver (1-2) Power Equipment Co.
Conn., Hartford (2) The Holmes-Talcott Co.
New Haven (1) W. I. Clark
Waterbury (1) Contractors Supply Co.
Del., Smyrna (1) King-Burrous
D. C., Washington (1) M. A. Doetsch Machinery Co.
Fla., Jacksonville (1) Julien P. Benjamin, Inc.
Tampa (2) S. M. Regar
Ga., Atlanta (2) Tractor & Machinery Co.
Savannah (1) Morgans, Inc.
Ida., Boise (1-2) Olson Manufacturing Co.
Ill., Chicago (1-2) Chicago Construction Equipment Co
Chicago (2) John A. Roche
Chicago (1) Thomas Hoist Co.
Ind., Fort Wayne (1) American Steel Supply Co.
Indianapolis (2) Reid-Holcomb Co.
Iowa, Des Moines (2) Electric Eng. & Const. Co.
Ky., Harlan (2) Hall Equipment Sales Co.
Louisville (2) T. C. Coleman & Son
Louisville (2) Williams Tractor Co.
Paducah (1) Henry A. Petter Supply Co.
La., New Orleans (1) Ole K. Olson Co.
New Orleans (2) Wm. F. Surgi Equipment Co.
Maine, Portland (1-2) Maine Truck-Tractor Co.
Md., Baltimore (1) Stuart M. Christhilf & Co.
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Mass., Boston, Allston (1-2) Clark-Wilcox Co.
Cambridge (2) W. W. Field & Son, Inc.
Mich., Detroit (1) T. G. Abrams
Detroit (2) W. H. Anderson Co., Inc.
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Muskegon (1-2) Lakeshore Machinery & Supply Co.
Minn., Minneapolis (1-2) Phillippi-Murphy Equipt. Co.
St. Paul (2) D. L. O'Brien
Miss., Jackson (1) Jackson Road Equipment Co.
Mo., Clayton (1-2) The Howard Corporation
Kansas City (1) Brown-Strauss Corp.
Kansas City (2) Machinery & Supplies Co.
St. Louis (2) W. H. Reaves
Neb., Lincoln (1) Highway Equipment & Supply Co.
N. J., Hillside (2) P. A. Drobach
Newark (1) Johnson & Dealaman
North Bergen (2) American Air Compressor Corp.
N. M., Albuquerque (2) Bud Fisher Co.
Albuquerque (1) Morrow & Co.
Roswell (2) Smith Machinery Co.
N. Y., Albany (1-2) Milton-Hale Machinery Co.
Buffalo (2) Dow & Co., Inc.
New York (2) Air Compressor Rental & Sales
New York (1-2) Hodge & Hammond, Inc.
New York (1-2) Railroad Materials Corporation
Olean (2) Freeborn Equipment Co.
N. C., Raleigh (2) Carolina Tractor & Equipment Co.
N. D., Fargo (1-2) Smith Commercial Body Works, Inc.
O., Cincinnati (2) Finn Equipment Co.
Cleveland (2) S. M. Clancey
Cleveland (1) H. B. Fuller Equipment Co.
Cleveland (2) Gibson-Stewart Co.
Marietta (2) Northwest Supply & Equipment Co.
Toledo (1) Edmund Supply Co.
Toledo (2) M. W. Kilcorse & Co.
Okla., Oklahoma City (2) Townsco Equipment Co.
Oregon, Portland (2) Andrews Equipment Service
Pa., Allentown (2) H. N. Crowder, Jr., Inc.
Easton (2) Sears & Bowers
Harrisburg (2) N. A. Coulter
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Philadelphia (2) Metalweld, Inc.
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El Paso (2) Equipment Supply Co.
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Houston (2) Dye Welding Supply Co.
Houston (1) McCall Tractor & Equipment Co.
San Antonio (2) Patten Machinery Co.
San Antonio (1) San Antonio Machine & Supply Co.
Utah, Salt Lake City (1-2) Landes Engineering Co.
Vt., Barre (1-2) A. M. Flanders, Inc.
Va., Richmond (2) Highway Machinery & Supply Co.
Wash., Seattle (1) Columbia Equipment Co.
Seattle (2) Star Machinery Co.
Spokane (2) Andrews Equipment Service
Spokane (1) Columbia Equipment Co.
W. Va., Charleston (1) West Virginia Co.
Fairmont (2) Interstate Engineers & Constr., Inc.
Wisc., Milwaukee (1) Mekeel Engineering Co.
Wyoming, Cheyenne (2) Wilson Equipment & Supply Co.

Blue Brute Diesels
Worthington Pump and Machinery Corp.
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Holyoke, Massachusetts



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Piles, Deck Precast For River Crossing

(*Continued from page 1*)

piles battered 1½ inches in 12 inches. The bridge has a 26-foot roadway with the safety curb and rail cast after the slabs had been placed. The slab is comprised of five reinforced-concrete girders, the two outside girders being 14 inches wide and the three inside girders 16 inches wide. The maximum depth of girder and slab at the center line is 3 feet 4 inches with the deck sloping ⅛ inch per foot to the sides. The corners between the deck and girders are chamfered.

The concrete piles vary from 65 to 82 feet long, with a total length of 14,115 feet being cast. They are 21 inches square with the last 4 feet tapered to 9 inches square at the tip, and are reinforced by eight 1-inch round bars longitudinally with No. 5 gage wire spiraled and spaced 3 inches at the top and bottom and up to 6 inches through the center section. The reinforcing bars extend 21 inches beyond the top of the pile for bonding into the caps and hence required a special driving cap.

Pile-Casting Yard

The pile-casting yard, adjacent to the yard where the deck slabs were cast, was close to the west end of the old bridge. A concrete floor 6 inches thick, 82 feet long, and 55 feet wide was poured first, with 2 x 4-inch strips cast in with the 4-inch dimension flat to permit nailing the forms in place. To protect the shore end of the yard, steel sheet piling was driven and at that end the



Photo by Whitaker

The mud wave caused by placing the east approach fill for the new bridge wrecked 262 feet of the old West Point, Va., bridge, necessitating a new detour bridge around the damaged section.

flooring was cast with a rise to take care of the taper of the piles on the bottom.

Pairs of forms were set up for alternate piles 21 inches apart, the assembled reinforcing placed in the forms, and then the pouring completed. After 48 hours the forms were stripped and building paper laid against the sides of the piles to make the forms for casting the balance. Four Richmond spirals were cast in the piles so that eye bolts could be screwed in for picking them up.

Slab Forms and Casting Yard

The slab-casting yard was about 300 feet long and enclosed on the sides by the gantry rails 47 feet apart. The rails were extended out over the water at the east end of the yard on 3-pile bents with longitudinal caps of 12 x 12's carrying 36-inch I-beams with the gantry rail welded to the top flange.

Within this yard concrete pedestals were cast 5 feet apart under the line of each girder and then a 12 x 12 laid across for the 40-foot width. The forms were made to be used repeatedly and were well designed for the purpose. The beam bottoms were made up as a single panel consisting of ¾-inch plywood with 2 x 4-inch studs on 16-inch centers extending 8 inches beyond the beam bottom to carry the vertical studs for the plywood for the beam sides. A bearing plate was cast in each beam at both ends.

The studs along the bottom of the

(*Continued on next page*)



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Piles, Deck Precast For River Crossing

(*Continued from preceding page*)

beam carried a 2 x 4-inch "kicker" or stringer against which the vertical 2 x 4-inch studs, also on 16-inch centers, for the sides rested and were lined up by means of wooden wedges between the vertical stud and the kicker. A 1 x 6 was nailed near the top of the vertical stud on which rested a 2 x 6 which carried the plywood deck form. The top of each of the 2 x 4-inch vertical studs was cut off for the chamfer between the deck and the beam.

The end of each deck slab has a ¼-inch key or butt 4 inches from the bottom and 3 inches from the top of the deck, cast to take up any inequality in the pouring of the end of the slab. When the keys of two adjacent slabs butted, a slot approximately ½ inch wide and 3 inches deep was produced which was caulked with asphalt mastic.

Holes 39 inches long were left through the deck and beam for the 1¼-inch dowels for the bearing plates. These holes were cast by using paper tubing with a galvanized-iron pipe filler to prevent collapse of the tubing.

The yard was long enough to assemble six complete slab forms at one time. When poured, each of these slabs contained 51 cubic yards of concrete and weighed approximately 110 tons. The steel gantry spanning the slab-casting yard had four 4-block 25-ton chain falls for lifting the slabs high enough to clear adjacent slabs so that they might be moved direct to the barge for transportation to the bridge. The contractor showed great ingenuity in the assembling of the gantry since steel is at such a premium. The girders of the gantry were salvaged railroad girders while the side panels were built up of H-beams from an old gun-cotton mill at Hopewell, Va. The trucks carrying the gantry were salvaged Wiley-Whirleys.

The slab was lifted by twenty 1-inch bolts 30 inches long running through to the ¼ x 4 x 4-inch plate washers. Wood 2 x 4's were cast into the slab around the bolts so that they could be burned out with the bolt and the holes filled with concrete. The lifting device consisted of two equalizing I-beams with double inverted-V straps between. The lower I-beam was attached to the slab by the 1-inch bolts for the full width of the slab. The straps attached by 6-inch pins to the bottom girder were carried to the central point at the top of the upper or equalizer girder at the ends of which the chain falls were attached, as shown in the illustrations.

The gantry was moved from one end of the yard to the other over the rails by a Domestic 2-drum hoist with a Twin Disc clutch and powered by a Hercules gasoline engine.

Concreting at the Yard

The contractor set up his own batching plant about a mile from the casting yard at a local railroad station, using a Butler plant with a Link-Belt crane and a 1¼-yard Williams clamshell bucket to keep it supplied. The crane was also used for moving the cars. The batches were hauled in three 2-batch trucks to a Rex 27-E paver with a 35-foot tubular tower built in front carrying a 1-yard bucket. This outfit moved under its own power around the yard for delivering to 5-cubic-yard hoppers on a barge which was towed to the cofferdams, or for pouring either slabs or concrete piles. Adjacent to the slab-pouring yard were two sturdy platforms on 10 x 12 skids with 12 x 12 posts, from which ramps were run out over the decks which were poured by concrete buggies served by the paver and tower outfit. The platforms were picked up by the power winch on the paver tower when it became necessary to move them from one slab-pouring position to another. It required 3½ hours to pour a slab. The forms were stripped in five days, while the slabs were cured with burlap and water for seven days.

One of the handiest service machines in the yard was a Hypressure Jenny which was used for cleaning equipment between pours.

(*Continued on next page*)

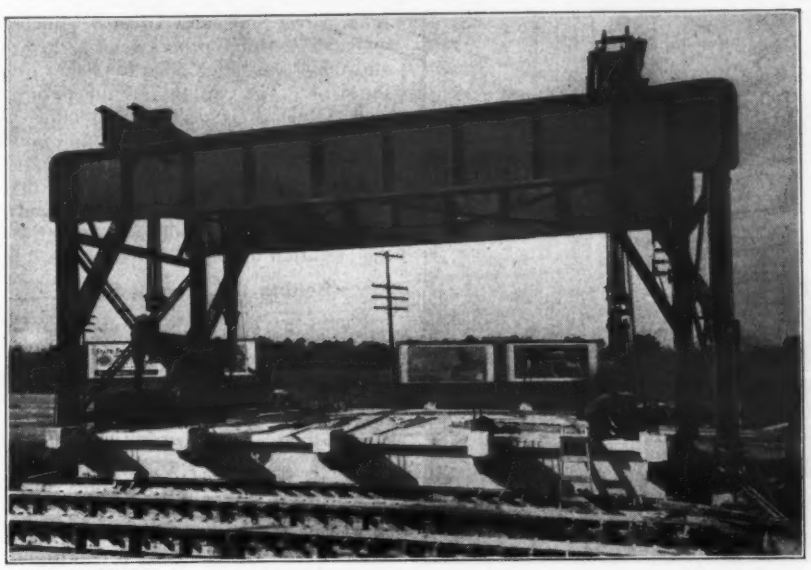


Photo by Whitaker

The 110-ton precast slabs for the West Point, Va., bridge were lifted from their positions in the casting yard by a stalwart gantry of salvaged structural steel and run out onto a barge for transportation to the bridge.



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Photo by Whitaker

A Rex 27-E paver with a 35-foot tubular tower moved around the concreting yard as required to pour piles and, as shown here, the 40-foot concrete deck slabs for the West Point bridge across the Mattaponi River in Virginia.

Piles, Deck Precast For River Crossing

(Continued from preceding page)

Concrete-Pile Bents

The piles were removed from the casting yard by one of the two floating Wiley-Whirleys, using an equalizing sling attached to the four pick-up points. The piles were loaded on a barge and floated out to the proper site for driving. Here they were placed in a structural-steel multiple guide made to take the five piles for one bent. The three plumb piles in the center were driven first and the outside batter piles last. Driving was done by a McKiernan-Terry No. 11-B double-acting steam hammer with the head arranged to fit over the protruding reinforcing bars on the pile. Between the pile and the head a plywood driving block was inserted to prevent damage to the top of the pile. To aid in the driving, the piles were jetted with water at 250-pound pressure at the rate of 1,000 gallons per minute, using a 6-inch line in which the pressure was maintained by two 6-inch and two 4-inch Jaeger pumps. The piles were driven an average of 15 feet to give a bearing of 30 tons each.

The caps on the approach-span bents are 3 feet 3 inches high and 33 inches wide. The abutments at the two ends of the bridge have three plumb piles and two batter piles the same as the bents but in addition have five front piles, on the side towards the river, battered 1 in 4. These piles carry caps 36 feet 6 inches long, 3 feet high, and 4 feet 8½ inches wide. The plumb piles extend 12 inches and the front batter piles 14 inches into the caps. The cap carries the parapet wall 3 feet 8 inches high extending 5 feet back from the abutment to retain the fill at the top.

Bents 1 and 31, which are the first ones riverward from the two abutments, are the same as the abutments except for the elevation and the parapet walls.

Setting the Precast Slabs

Each precast deck-and-girder slab was picked up by the gantry and moved out over the dock between the gantry rails and set on a heavy falsework amidships of a 110 x 35-foot steel barge. Two Jaeger pumps were carried to trim the barge by pumping water from or into the end sections. The barge was towed on flood tide to the place where the slab was to be set, going in against the run of the tide. The slab was lowered onto wood blocks between the girders at each end of the slab by ballasting the barge with water. As soon as the slab rested firmly on the blocks, the barge was floated out, the additional bearing plates placed, and 25-ton screw jacks installed between each girder at each end to take the load. The recesses for the bearing plates were filled with a stiff mortar and then the screw jacks were used to lower the slab slowly and uniformly into place.

The slabs were waterproofed from below the bottom of the deck with four coats of RT-6 tar and one of RT-9 on the outside, applied by hand brushing.

Swing-Span Piers

At the site of the 30-foot 6-inch swing-span pier a cofferdam was built, using 60-foot Bethlehem steel sheet piles driven by a McKiernan-Terry No. 9-B steam hammer handled by one of the two floating Wiley-Whirleys. The cofferdam was then excavated by the Wiley-Whirley with a 110-foot boom capable of handling a 50-ton load at a radius of 45 feet and mounted on a 110 x 80-foot steel barge. This machine excavated about 18 feet of soft mud to fairly stable sand

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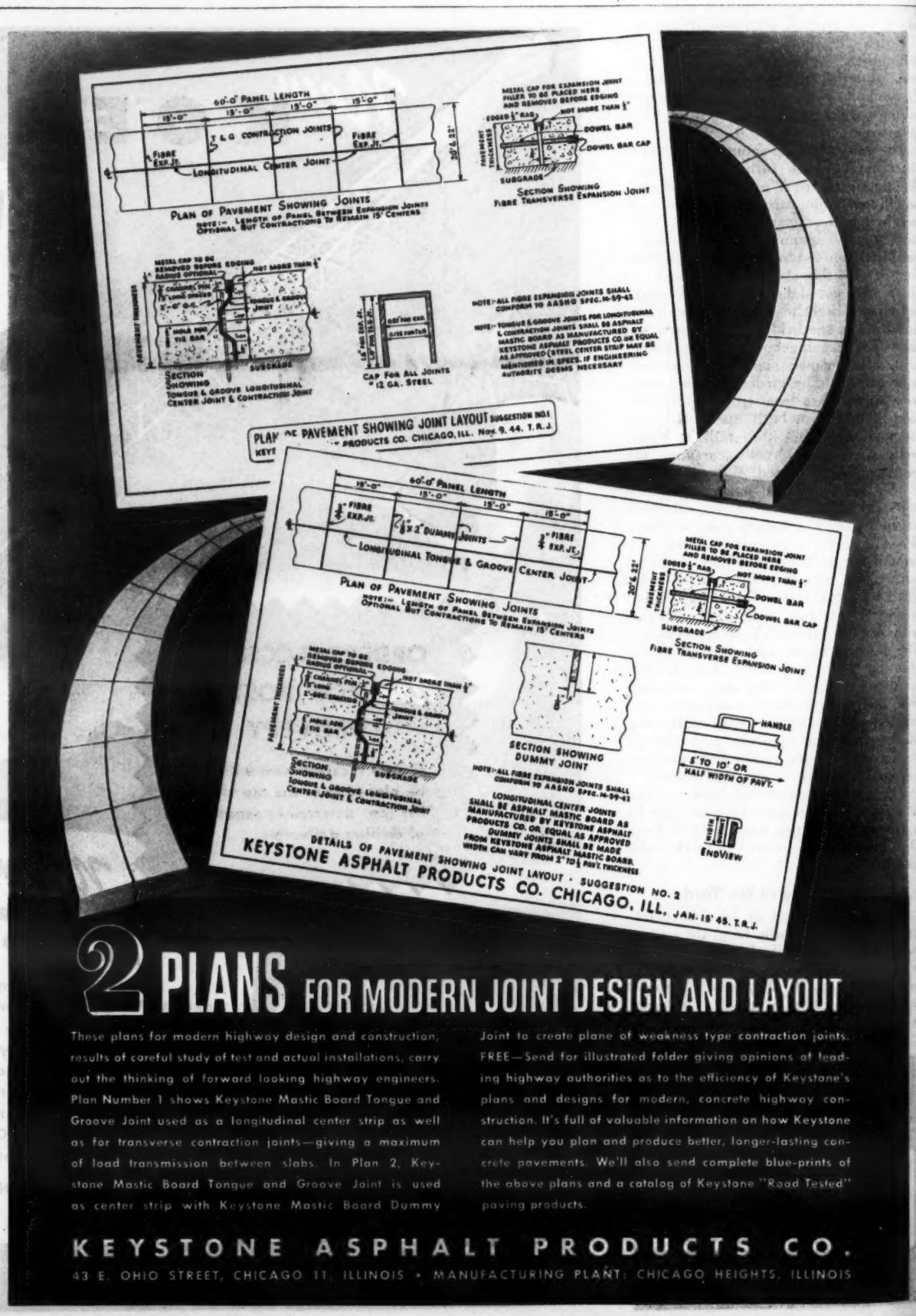
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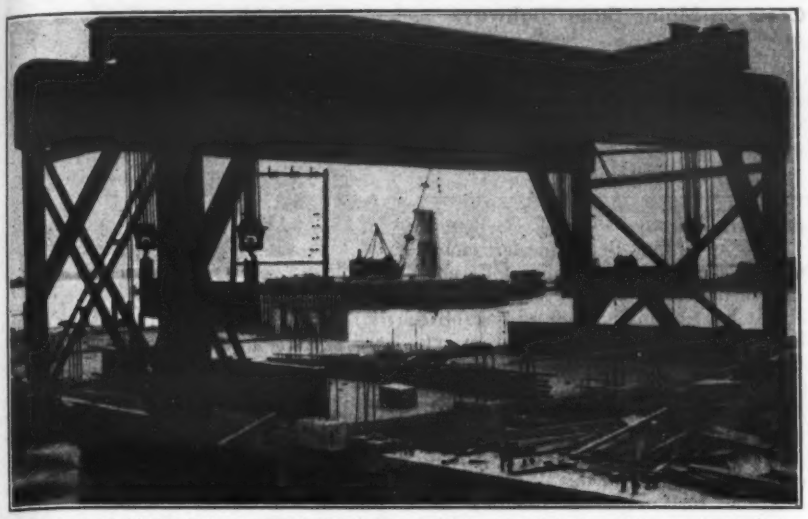


2 PLANS FOR MODERN JOINT DESIGN AND LAYOUT

These plans for modern highway design and construction, results of careful study of test and actual installations, carry out the thinking of forward looking highway engineers. Plan Number 1 shows Keystone Mastic Board Tongue and Groove Joint used as a longitudinal center strip as well as for transverse contraction joints—giving a maximum of load transmission between slabs. In Plan 2, Keystone Mastic Board Tongue and Groove Joint is used as center strip with Keystone Mastic Board Dummy Joint to create plane of weakness type contraction joints. FREE—Send for illustrated folder giving opinions of leading highway authorities as to the efficiency of Keystone's plans and designs for modern, concrete highway construction. It's full of valuable information on how Keystone can help you plan and produce better, longer-lasting concrete pavements. We'll also send complete blue-prints of the above plans and a catalog of Keystone "Road Tested" paving products.

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The deck slabs for the new West Point, Va., bridge were picked up by a gantry using two equalizing I-beams on each side. The lower beam was attached to the slab by 1-inch bolts for its full width. The multiple leads for driving the bents are seen in the center, framed by the gantry.

Major Quantities in West Point Bridge

	Concrete—Cu. Yds. Class A	Concrete—Cu. Yds. Class A Seal	Reinf. Steel Pounds	Excav. Cu. Yds.	Concrete	Piles—Lin. Ft. Treated	Piles—Lin. Ft. Untreated
Superstructure	1,946.0	....	491,815	...	.....	.....	.....
Abutments	26.2	....	3,335	...	1,380	.....	.....
Bents 1 & 31	22.0	....	2,610	...	1,380	.....	.....
Bents 19, 23, 24, 28	39.0	....	4,395	...	1,560	.....	.....
Standard bents	222.5	....	24,450	...	9,795	.....	.....
Rest piers	272.0	165.8	16,830	300	.....	.....	3,800
Pivot pier	343.2	263.1	25,350	355	.....	.....	5,400
Fender system	.....	....	.....	...	.....	12,675	.....

a solid stem 27 feet 6 inches high is carried up and at 17 feet from the footing is connected with a solid cross wall 24 inches thick to the bottom of the cap. This cap is 28 inches thick and 5 feet 3 inches wide.

Quantities

The major quantities for the West Point Bridge, later named the Lord Delaware Bridge, are given in the table.

Personnel

The plans for the West Point Bridge were prepared by the Virginia Department of Highways, General J. A. Anderson, Commissioner, C. S. Mullen, Chief Engineer, and W. R. Glidden, Bridge Engineer. The contract for construction was awarded to the Diamond Construction Co., Washington, D. C., for $403.761.52. For the contractor, Burton Crumrine was Superintendent, and H. E. Piercy was Chief Inspector and Project Engineer for the State. Carnegie-Illinois Steel Co. furnished the steel for the swing span which was fabricated by Virginia Bridge Co. of Roanoke, Va.

The Highroads Department of the Newfoundland government has been seriously handicapped in its road program by the inability to secure tractors which have been on order since the spring of 1942, says Foreign Commerce Weekly.

Piles, Deck Precast For River Crossing

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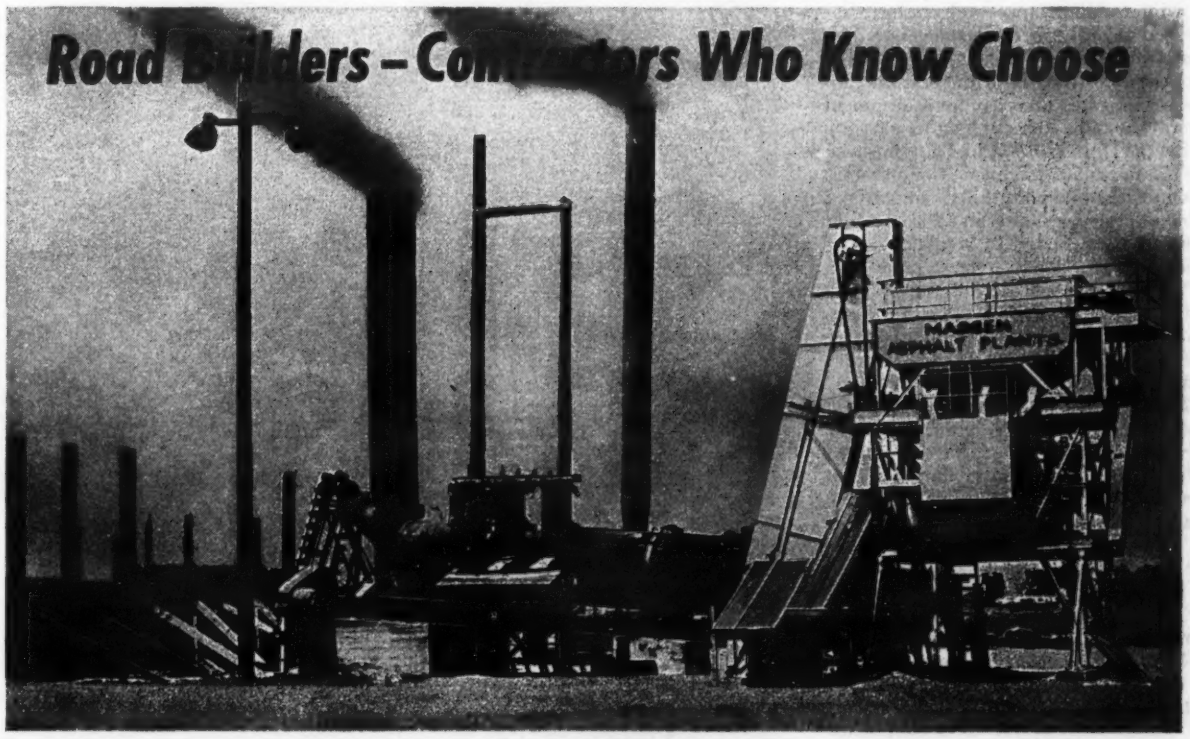
and blue mud with a 1½-yard Williams bucket. Most of this material was barged out and dumped. Following this, 108 untreated 60 to 70-foot wood piles were driven in concentric rings by a No. 10-B-3 McKiernan-Terry pile hammer using air and steam under water, with the hammer supported by a spud to hold it in line. Next a stabilizer fill of washed gravel was placed, followed by an 11-foot concrete tremie seal through which the wood piles extended for 12 inches. The concrete for the seal was mixed on shore and taken out in 5-yard Insley side-dump hoppers which were mounted in pairs on two 20 x 40-foot wood barges. The concrete was run into a 1-yard Blaw-Knox Roller-Gate bucket swung from the 110-foot boom of the Wiley-Whirley and placed through a 10-inch-diameter tremie.

After the seal had set, the cofferdam was pumped out, using two 6-inch and two 4-inch Jaeger pumps. The surface was cleaned and then a 3-foot footing was poured, following which the 30-foot 6-inch-diameter shell 18 inches thick was poured to a height of 25 feet 11¼ inches, with two 26-inch cross walls. The deck on this cylinder is 2 feet 2 inches thick with a 2 x 2-foot counterfort, and has a cantilever bracket running 5 feet 3¼ inches out at either side along the center line of the span for the wedges for the swing span.

The inside forms for the barrel of the swing-span pier were made up of 1 x 6 lumber lined with $\frac{3}{16}$-inch fiber board. There were sixteen panels for the outside of the barrel, made up with ribs cut from 2 x 8's to fit and double 2 x 6-inch vertical wales. Richmond Tyscrus were used for form ties throughout.

The rest piers for the two ends of the swing span were built the same as the pivot pier but only 13 feet in diameter. There are two barrels for each rest pier 31 feet 11 inches on centers. The seal for the rest piers is only 9 feet 6 inches, topped with a 3-foot footing 11 feet 9 inches in diameter and a 2-foot footing 8 feet 4 inches in diameter. From this,

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Snow-Removal Costs Continue to Increase

Public Demands for Better Winter Roads, Wage Increases, Equipment Care Boost Rate per Mile

✦ THE public is constantly demanding better winter maintenance of state highways and secondary roads through prompt removal of snow, immediate sanding whenever there is a chance of ice forming on the roadway surface, protection of roads by the installation of snow fence in the autumn, and the maintenance of open ditches so that the roads will drain promptly in the spring when the thaws begin. Probably the one item to which state highway departments are generally paying more attention than any other is ice control by sanding with or without chlorides.

All of this attention to winter maintenance costs money, but generally the public is willing to pay for what it wants so winter-maintenance budgets have increased steadily in most states over the past two decades. No small item in the increased cost has been the constant increase in rates of pay for equipment operators and labor.

Lucius D. Barrows, Chief Engineer of the Maine State Highway Commission, has furnished us with the accompanying table of costs beginning in 1935, the first year when a sufficient breakdown was made of expenses to give reliable data on the relative cost of different winter-maintenance operations on the highways. In Maine, the law did not provide for the State to take part in snow-removal operations until 1927.

Mr. Barrows calls attention to the fact that wages for common labor, as well as all other types of labor, have increased substantially, particularly during recent years. The wage for common labor in Maine from 1935 to 1940 inclusive was 35 cents per hour as far as work under the direction of the State was concerned. In 1941, the hourly wage was 38 cents, in 1942 it went to 40, 44, and 50 cents per hour, in 1943 it was 55 cents, and in 1944 it was 62 cents an hour. The cost of doing the work, Mr. Barrows points out, is of course necessarily influenced by wages but, as far as actual snow removal is concerned, the kind of winter with its depth of snow and frequency of storms has a great deal to do with annual costs.

Snow-removal operations in Maine cover about 14,000 miles of which 2,816 miles are on the state highway system.

Breakdown of Winter-Maintenance Costs on Maine State Highways

Season	Highway Total Mileage	Plowing	Sanding	Snow-Fence Cost	Supervision	Total Cost	Average Cost Per Mile
1935-36	2,358.90	$220,023.24	$111,369.31	$48,636.47	$7,383.36	$387,412.38	$164.24
1936-37	2,433.46	149,857.94	167,267.04	48,381.54	7,373.38	372,879.90	153.23
1937-38	2,555.90	185,239.39	211,661.80	58,003.67	9,221.68	464,126.54	181.59
1938-39	2,633.04	226,536.01	213,934.35	57,453.09	9,689.58	507,603.03	192.79
1939-40	2,697.12	215,906.25	190,063.16	86,438.36	8,866.56	501,274.33	185.83
1940-41	2,696.45	232,099.65	224,833.91	35,997.66	8,491.12	501,422.34	185.96
1941-42	2,817.71	250,558.81	229,558.56	56,380.44	6,903.39	543,398.20	192.85
1942-43	2,814.76	321,784.37	314,559.94	82,099.13	7,504.15	725,947.79	257.91
1943-44	2,816.20	305,276.20	341,492.58	88,799.91	7,594.08	743,162.77	263.89

New Traveling Crane Runs on Eight Tires

A new wheel-mounted utility shovel-crane has been developed by Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago 9, Ill., to do the score of different jobs which make up the schedule of state, county, or township highway departments and contractors. This Model UC-55 is a ½-yard machine with a lifting capacity of 6 tons and can be driven over the highway at speeds up to 10 mph. It is only 8 feet wide, has a wheelbase of 7 feet 6 inches, and its weight, equipped as a shovel, is 26,350 pounds. It is mounted on four sets of dual wheels equipped with 10.00 x 20 12-ply pneumatic tires.

This new Link-Belt Speeder mobile unit is steered from the operator's position in the crane cab by hydraulic power. It has automatic hydraulic stabilizers which lock the oscillating front axle in any position to increase the stability of the machine. Power hydraulic brakes lock the machine against movement when digging.

The Model UC-55 is convertible, with conventional attachments for use as a dragline for stripping, ditching and stream channel work; as a shovel for excavating, loading gravel, making highway cuts and culvert trenches; as a crane with a hook-block for lifting and erection; or with a clamshell bucket for handling material, digging deep trenches, shafts or for close-quarter excavation. As a pile driver for repairing bridges and retaining walls it drives piles at 4 to 6 blows per minute with a drop hammer.



The new Link-Belt Speeder mobile crane is a versatile unit with ½-yard capacity as a shovel, or 6-ton as a crane.

Booklet 2051 which fully describes this machine may be secured direct from the manufacturer by mentioning this news item.

Yarrow Leaves CAA, Joins Airport Consultants

J. R. Yarrow, Airport Turf Engineer, Airport Service, Civil Aeronautics Administration, has resigned from that post to join Airways Engineering Consultants, Inc., 1621 Connecticut Ave., N. W., Washington, D. C., where he will be in charge of the organization's turf-development program. For the past two years Mr. Yarrow has been working on the study and analysis of turfing standards, methods, procedures, and results with the Bureau of Yards and Docks, U. S. Navy, the Corps of Engineers, U. S. Army, and the Airways Engineering Division, Civil Aeronautics Administration.

During this period he has visited over 220 airports in some thirty states to secure case histories of the turf at each airport. The purpose of this study was to determine post-war needs of small airports. This included an intensive investigation of all sources of material as well as site studies. For the past year, Mr. Yarrow has also served, with Dr. John Monteith, Jr., Principal Agronomist, Corps of Engineers, as Advisory Turf Consultant for the Civil Aeronautics Administration.



Town Money Available To Improve Highways

While some Massachusetts cities are scraping the bottom of their financial barrels, the majority of the Commonwealth's towns are in excellent condition financially. Collectively, these smaller and well ordered municipal units show surpluses approaching $175,000,000, according to Theodore N. Wardell, Director, Division of Accounts.

As the Boston *Globe* puts it, "As war clouds fade and the country's industrial plant reverts to peacetime processes, these funds will be expended to do things administratively that would have and should have been done in normal times. This will add to the general welfare, when materials and labor are available."

For the most part, the money will go for the maintenance of existing highways and for the construction of some new roads with State-Aid through Chapter 90. Also, the mechanical equipment of most of the towns is sadly in need of renewal.

The financial aspect is of particular interest. As real-estate taxes have not been much in arrears, most Bay State towns have improved the collections of accounts receivable and, all together, they have cut down their debt by about $140,000,000. War means destruction and waste on a colossal scale, but paradoxically it has eased the burden on the smaller governmental units and they have made the most of their opportunity, in Massachusetts at least.

A Non-Spatter Film Saves Weld Cleaning

A new liquid designed to minimize the sticking of welding spatter to adjacent metal, and hence reducing the cleaning time, has been announced by the Lincoln Electric Co., Cleveland, Ohio. This new product, costing only a few cents a quart, is known as Lincoln Non-Spatter film.

After the film is applied, welding can start at once whether the film is still wet or dry. It can be sprayed or painted on the work and priming coats of paint may be readily applied over the film. If it is desired to remove the film before painting, it is easily accomplished by washing with water.

One application of the film is said to be effective for multiple-pass welding. If the film is sprayed or painted on parts prior to being normalized, the oxide film and ordinary scale can be removed more easily after heat treating. The material will freeze, but freezing has no effect on its properties when thawed out.

The new material is supplied in concentrated form in 5-gallon cans for the convenience of the user. By diluting the concentrated material with three parts of water, 20 gallons of film fluid are obtained. Either brush or air gun can be used to apply the film in the areas adjacent to the joint to be welded and to welding jigs that may be subjected to spatter. After welding, the spatter can be removed easily by wiping or brushing, thus reducing the cleaning time.



WAITING...

158,466 Miles of Roadwork

IMAGINE *fifty* transcontinental highways, or a road running *six times around the earth* at the equator. That will give you an idea of the estimated mileage of roads scheduled to be rebuilt, widened and relocated after the war. *And this is only one item in an estimated $15 billion expenditure for postwar construction!*

To handle this unprecedented volume of work, construction equipment—old and new—must function at maximum efficiency, with minimum maintenance. Effective lubrication is the biggest single factor in assuring this...and, on the basis of experience, contractors everywhere use Texaco.

Texaco Marfak, for example, used in your tractors, shovels, bulldozers, trucks, etc., provides ideal film lubrication inside a bearing, yet maintains its original consistency at the outer edges . . . sealing itself in, sealing out sand, dirt, water. Its tough adhesive film cushions bearings against road shocks. Makes parts last longer.

For wheel bearings, use *Texaco Marfak Heavy Duty.* It stays in the bearings—off the brakes. Seasonal repacking is no longer required.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed below.

Texaco Lubrication Engineering Service is available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT



adeco...

NOZZLE TESTER

Keeps Diesel Engines Running Efficiently

To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p. s. i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.



TESTS FUEL INJECTORS AND HYDRAULIC DEVICES at Pressures up to 10,000 p.s.i.

Write for bulletin on this practical, low-cost unit.

ADECO AIRCRAFT & DIESEL EQUIPMENT CORP.

DEPT. 9: 4411 N. RAVENSWOOD AVE. CHICAGO 40, ILLINOIS

SUPERINTENDENT; FOREMAN WANTED

Superintendent to assist in erection of and later operate a new READI-MIX concrete plant. Also ***Foreman*** for lumber, coal and Bldg. Material yard to supervise trucks, workmen, and loading materials.

Address:

Frederick G. Smith and Co.
327 E. Stephenson St.,
Freeport, Ill.

New Plan to Speed Surplus-Goods Sale

A modification in the sales procedure and greater latitude in the operations of the Regional Offices have been announced by the Office of Surplus Property of the Department of Commerce, in order to speed up the sale of surplus war goods.

The modification is concerned with the former requirement that property with a total acquisition cost of $1,000 or more be listed in the Surplus Reporter. Under the new ruling, such listing is necessary only in the case of items of a significant amount, which means that generally property having a value of $5,000 or less and which can be absorbed in the regional market will not be advertised in the Surplus Reporter but will be offered by special listings as soon as it is ready for sale. Widespread publicity of offerings will still be the rule.

Regional Directors have been told that as a rule-of-thumb they should regard the highest bid offered as the market value of the property. Thus, the high bid will generally be accepted, assuming that there has been proper circularization of the offering.

Regional field men have been urged by A. U. Fox, Director of the Office of Surplus Property, to take prompt action to dispose of every salable item of surplus in stock, and to keep them moving in order to avoid building up of large inventories.

All-Green Wire Rope

Wire rope of improved plow steel made by American Chain & Cable Co., Bridgeport, Conn., has for a long time been identified by a single green-colored strand. Emerald green having been adopted as the ACCO color, this manufacturer has established a formula for a lubricant colored green for use in its identifying strand. That this green lubricant is definitely superior to the black lubricants previously used has been proved by years of field service, American Chain & Cable Co. states. Now this green-colored lubricant will be used by the American Cable Division and the Hazard Wire Rope Division of the American Chain & Cable Co. on their highest-grade ropes, preformed of improved plow steel.

This new lubricant, known as Green-Lube, has high viscosity and capacity for adhesion to the surfaces of the wires. It has a grease-like consistency at normal temperatures and is applied hot and in a molten state by the pressure method which not only assures complete coverage of every wire but the filling or stuffing of the voids between wires. In this way it protects the wires better, enables them to adjust themselves more easily, adheres to the wires longer, and thereby develops longer rope wear.

LACLEDE HIGHWAY STEELS



WIRE MESH
Slab reinforcement keeps cracks closed and holds slab together.

DOWEL SPACERS
Assures correct alignment and simple installation of shear dowels.

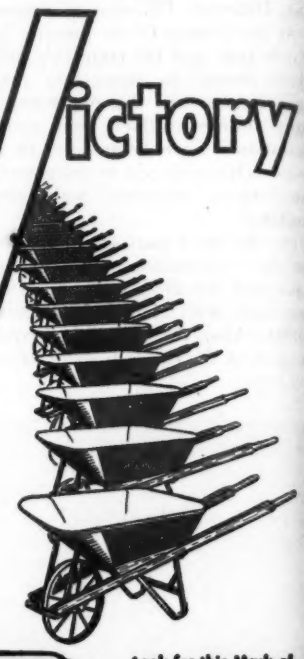
CENTER JOINT
For controlling longitudinal cracking of pavement.

Specify Them!!

REPORTED HIGHWAY RESEARCH INDICATES STEEL REINFORCEMENT IS NECESSARY IN PAVEMENTS FOR LONG LIFE AND LOW MAINTENANCE.

LACLEDE STEEL COMPANY
ST. LOUIS, MISSOURI

Sterlings too, are helping to win Victory



Regiments of sturdy pre-war Sterlings are helping Uncle Sam on the home front, and the entire Sterling factory is being utilized for essential war production...two good reasons why Sterling Wheelbarrows are practically unobtainable today.

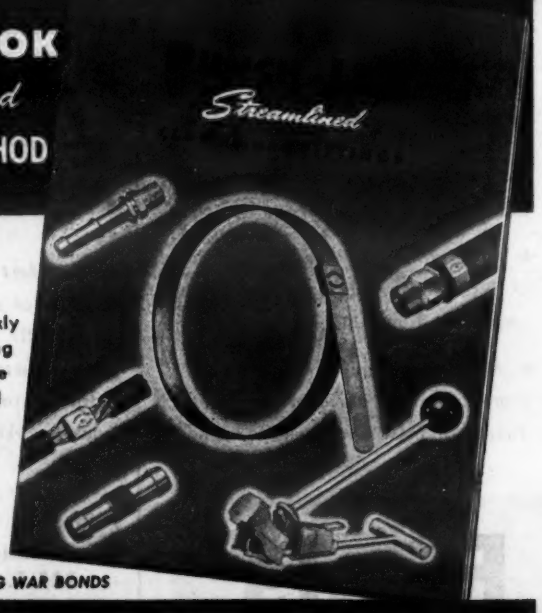
After peace has been restored, Sterlings will again be available, in all styles and capacities, to help in the reconstruction work.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

Clamp-Splice-Tie-Mend-Reinforce with PUNCH-LOK Streamlined BANDING METHOD



Punch-Lok Clamps, quickly applied with the Loking Tool, save money and time in your production and maintenance operations. Send now for descriptive catalog and name of nearest distributor.

KEEP BUYING WAR BONDS

PUNCH-LOK COMPANY
Dept. I, 321 No. Justine St., Chicago 7, Illinois



WE'LL BE READY, WILL YOU ?

Are you preparing to meet the keen competition that is predicted once the tremendous postwar construction boom gets underway? It's not a moment too soon to be thinking about the new rig you'll need . . . dependable, economical equipment that will turn in a profit on every job.

We'll be ready to fill your requirements with the most complete line of construction and excavating equipment ever to bear the century-old Osgood name. The same engineered design and precision construction, that have always characterized Osgood equipment, are applied to more than a dozen Osgoods from ⅜ to 2½ yards capacity.

We'll be ready, too, with new and improved Mobilcranes, likewise equipped with every improvement in design and manufacture that wartime work has uncovered. Whatever your postwar needs, you'll find the answer in an Osgood . . . "proved in world-wide service."

THE GENERAL EXCAVATOR COMPANY CRANES, DRAGLINES AND SHOVELS DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

OSGOOD CRANES SHOVELS DRAGLINES

THE OSGOOD COMPANY • MARION, OHIO

OSGOOD SHOVELS, DRAGLINES CRANES

Lift Added to Levee On Lower Mississippi

(*Continued from page* 1)

four times because of the river bank's being washed away. Strong winds and heavy traffic in the lower section of the river below New Orleans, with resultant wave action, together with swift, deep currents, help to erode the river banks and the levees which surmount them.

The 61,000 cubic yards which made up this enlargement was evenly distributed over the more than mile-long levee so that a little over 1,000 cubic yards was moved per station. At this point in the river the levee is fairly straight and its width through the base averages 122 feet. The slope on the land side is 1 on 3.5, while the river-side slope is never steeper than 1 on 2.5. The first lift was built to a height of 7 feet below that of the intended gross grade of the crown which is now 23.8 mean sea level. High waters have already crept up the slope of the first lift but did not top it, and with the addition of the second lift extra protection is afforded with a greater sense of security to those who dwell in the rich bottom lands of the deep delta country.

From the toe of the river slope a flat berm extends 40 feet towards the river where the ground then drops away with a 1 on 2 slope for a horizontal distance of 6 feet. Beyond this point, excavation may be made for borrow material but not to such a depth that a 1 on 10 slope cannot be maintained. This area of silty clay became the borrow pit to furnish material for the second lift. In 1944, when the levee was moved back the distance of its width at the base, excavation did not go below ground level. Consequently this silt accretion, accumulated through the years, was now available for use in the levee enlargement.

Dragline Employed

To move the material from the river-front borrow to the top of the first lift, a Koehring 604 dragline with a 75-foot boom and a 1½-yard Hendrix perforated manganese-steel bucket was used. The dragline worked along the berm on wooden mats, placing the material directly on the levee without rehandling. The distance the clay was moved ranged between 80 and 120 feet. When the dragline was working at the limits of its reach and depositing fill on top of the existing levee, a Caterpillar D7 tractor with a LeTourneau bulldozer moved the material off the crown of the existing levee, and pushed it to the land-side slope which was beyond the reach of the dragline.

In order to allow for settlement in this extra 7 feet of height, the contractor built up the grade 0.4 feet above the engineers' gross grade. To get the required cross section, the dragline had to deposit 20 per cent extra material or 200 cubic yards more than the 1,000 cubic yards necessary for each station.

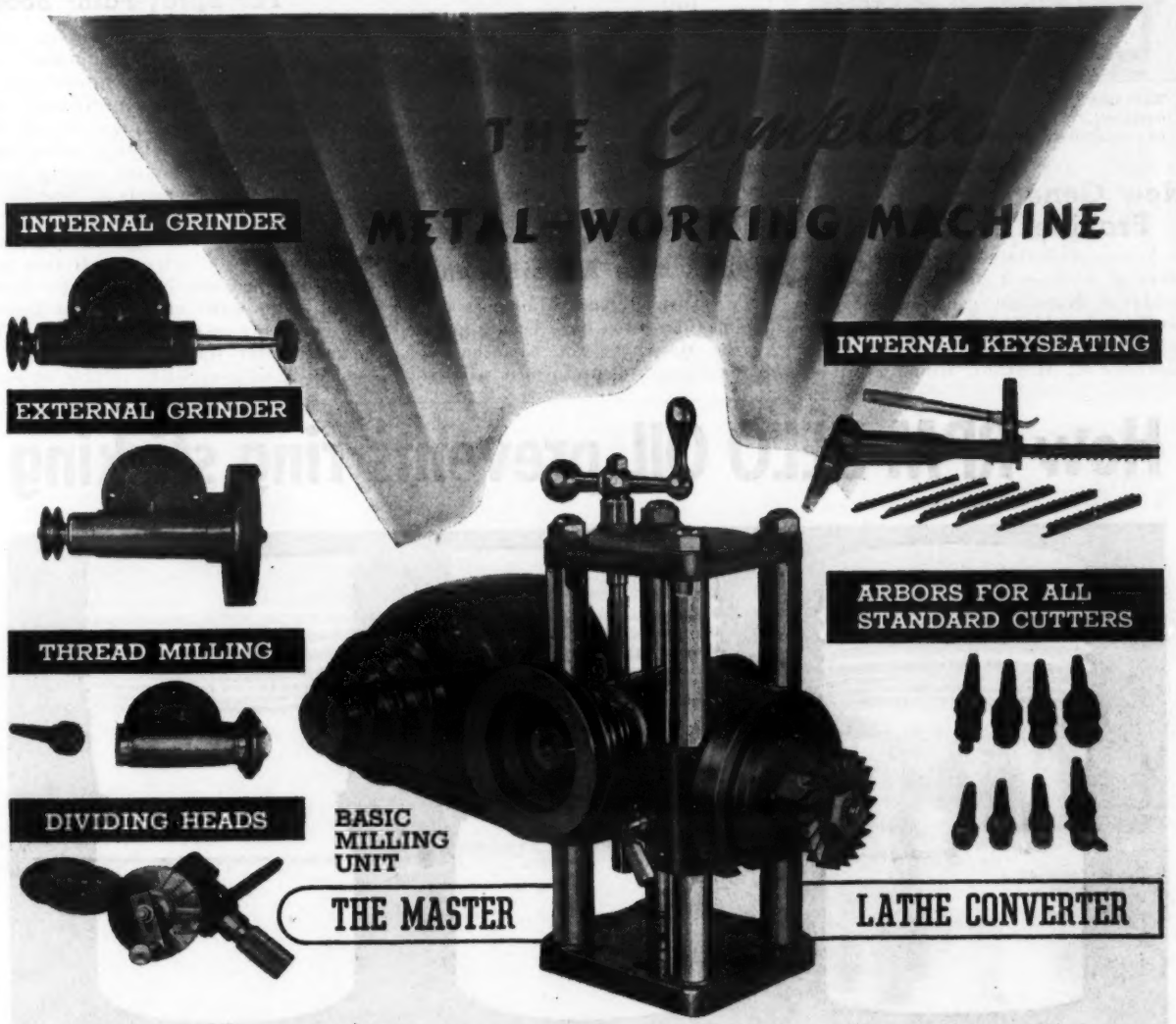
The big dragline completed one station at a time before moving along the berm, but as the heavy silty clay piled up on top of the first lift another dragline was brought in to dress the slopes, releasing the tractor with bulldozer to work along with the Koehring machine. The second and lighter dragline was a Lorain 40 with a 45-foot boom and a ⅞-yard Hendrix perforated bucket. This rig worked on timber mats on top of the fresh fill, dressing the slopes and flattening the crown to a width of 10 feet.

Production and Personnel

The larger dragline engaged in moving the earth worked a full 24-hour day and deposited an average of 3,000 cubic yards of fill during that daily period. The smaller machine worked a 12-hour day and maintained a daily average of 300 linear feet of slope dressing. The total force on this project did not exceed a dozen men, working under the direction of Daniel Valentine, an Assistant Superintendent for T. L. James & Co., Inc., Ruston, La., the contractor. The cost of this second-lift enlargement of the Merrit levee at Violet, in the Lake Borgne Levee District, St. Bernard Parish, La., was $14,640 and the job was completed in February after a working period of 60 days. The slopes were sodded this spring.

C. P. Bernard was Engineering Inspector on this levee enlargement for the U. S. Engineer Office, New Orleans District, of which Colonel George H. Hudson, Corps of Engineers, is District Engineer and Major A. H. McRae is Executive Officer. Walter C. Carey is Chief of the Inspection Division of the District.

Secretary of War Stimson has denied rumors that the Army may abandon the Alaska Highway which was built at a cost of more than $139,000,000, according to Highway Highlights.

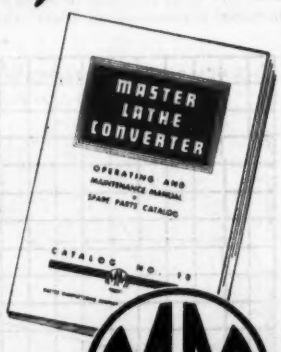


PRECISION PERFORMANCE *in Milling, Grinding, Drilling, Boring, Threading and Keyseating*

The MASTER LATHE CONVERTER, with interchangeable heads, will perform almost ANY metal work operation. Designed primarily for Engine Lathes, it can also be used on Planers, Shapers, Milling Machines, and Boring Mills.

Rugged in construction, simple in design, and accurate in operation, the MASTER CONVERTER has proved to be the MOST ADAPTABLE machine tool for maintenance, repair, tool, and experimental departments on the home front and battle front — in every major branch of the armed services.

TIME and SPACE are at a premium — maintenance and production are essential — the MASTER CONVERTER, is the answer. Why not investigate what this remarkable machine will do for you?



Catalog No. 10 Includes Operation and Maintenance Manual—ASK FOR IT!

the MASTER MANUFACTURING COMPANY
HUTCHINSON, KANSAS, U. S. A.

MM LATHE CONVERTER

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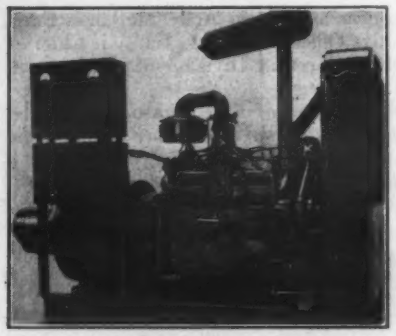


A VALUABLE ROGERS TRAILERS FEATURE

FORMERLY tire changing required jacking up the trailer and in some cases the removal of the whole axle unit. A big job in any event that was especially difficult if a tire went out while carrying a load.

With Rogers Trailer this job is comparatively easy, as it is possible to remove any tire without disturbing other casings.

ROGERS BROTHERS CORP. ALBION, PENNA.



This new 15,000-watt Katolight plant is designed for providing light and power on construction jobs or for stand-by service.

New Generating Plant Provides 15,000 Watts

A new 15,000-watt 120/208-volt ac 60-cycle 3-phase 1,200-rpm revolving-field-type Katolight generator has recently been added to the line of electric power plants made by the Kato Engineering Co., Mankato, Minn. Powered by a Model T-118 Chrysler 6-cylinder 4-cycle water-cooled engine, this new plant is designed to provide continuous power for lights or portable electric tools on construction jobs or for stand-by service in case of power-line failure.

The Katolight Model 52MPK6 is ruggedly constructed, economical, and designed for years of trouble-free service, the manufacturer states. It is 70 inches long x 49½ inches high x 24⅜ inches wide, and weighs approximately 1,860 pounds. At slight additional cost, it is available for direct current or special voltages.

Further information on this recent addition to the Katolight line, which includes generators ranging in size from 300 to 25,000 watts, may be secured direct from the manufacturer.

Macwhyte Appointments

Two District Sales Managers in the Pacific Coast area have been appointed by the Macwhyte Co., Kenosha, Wis., manufacturer of preformed wire rope and wire-rope fittings. Fred M. Sime will cover the Southwest District, operating from the company's San Francisco office at 749 Bryant Street, and William J. Brett is the Northwest District Sales Manager, located in the Portland, Ore., branch office at 1603 N.W. 14th Avenue.

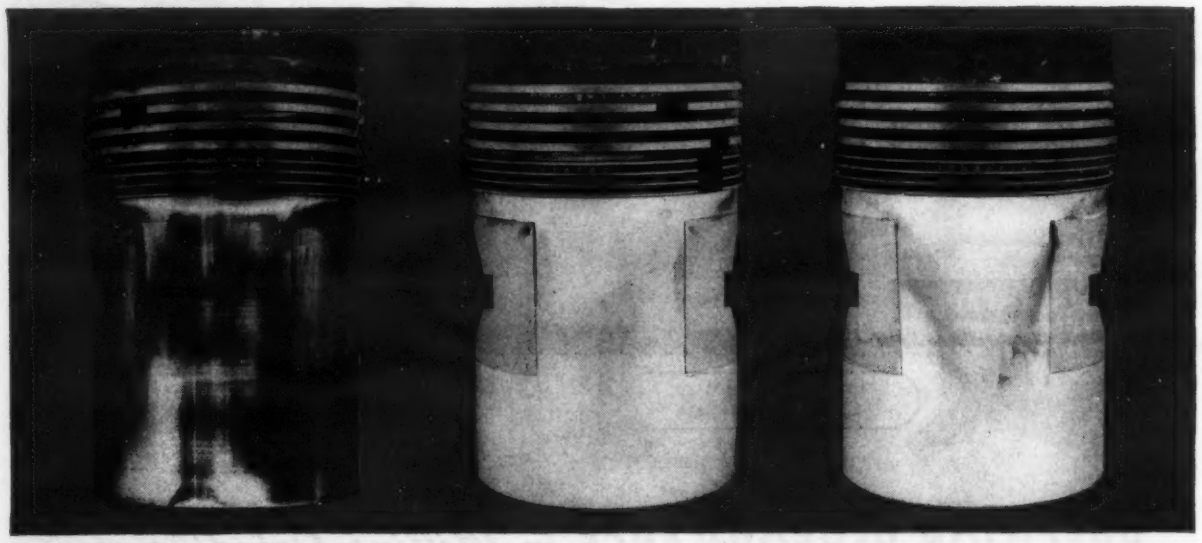
Catalog on Compound For Spray-Paint Booth

The present use of the water-wash type of spray-painting booth in state and county highway shops requires an effective wetting agent to prevent the accumulation of paint pigment on the walls, lines, and circulating system and to reduce the fire hazard arising from the collection of pigments in the exhaust stacks.

Traversite, a white granulated crystalline powder of high concentration, has been designed specifically for the treatment of the water in paint spray booths by The Penetone Co., Tenafly, N. J. The manufacturer states that Traversite is quickly and completely soluble in cold solution, it causes no heavy residue to settle to the bottom of the tank, it provides maximum wetting qualities, and is safe and easy to use, causing no irritation to the skin of the workers.

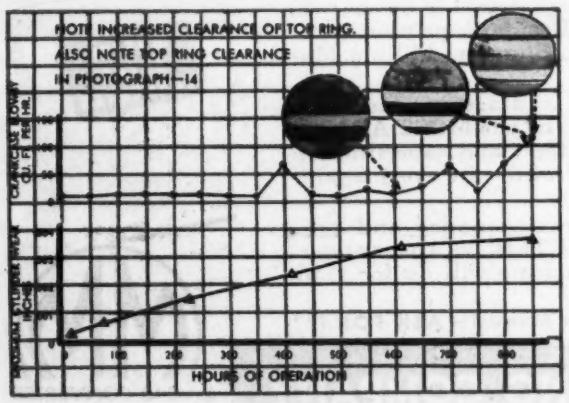
A new 2-page bulletin giving further details on the properties and use of Traversite may be secured by those interested direct from the manufacturer.

How RPM DELO OIL prevents ring sticking

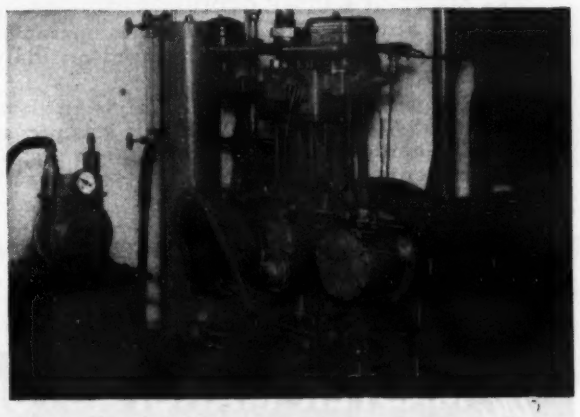


Even the finest uncompounded mineral oil will leave deposits on rings and skirts when operated under severe engine conditions. The above photo shows a test engine piston after 264 hours operation with the finest obtainable uncompounded Diesel engine oil.

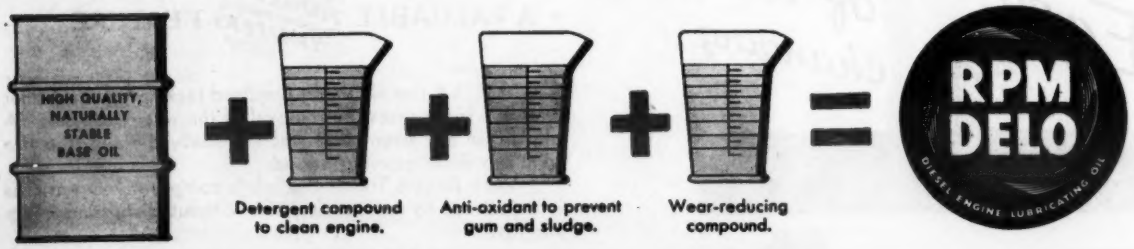
Here's the same test made with RPM DELO Oil, only this time for 1000 hours—more than double the 480-hour test required in current military specifications. The photographs above show both thrust and anti-thrust sides of a piston after a 1000-hour test with RPM DELO Diesel Engine Lubricating Oil. Note that RPM DELO Oil has almost entirely prevented any deposits on skirts. Dark areas around rings are only soft carbon, not sticky varnish. The compounding in RPM DELO Oil makes this possible by preventing the initial formation of sticky varnish.



How blowby caused by cylinder and ring groove wear increases rapidly is shown by the above chart. Excessive side clearance caused by ring groove wear allows the ring to rock in its groove and "bite" into cylinder walls. RPM DELO Oil checks this wear at the start by an adhering agent which makes it cling to hot cylinder walls.



This single cylinder laboratory engine is used to measure the ring-sticking characteristics of Diesel lubricants. The test record of RPM DELO Oil has been confirmed by sales of millions of gallons since its development. For more technical information on RPM DELO Oil, write for Booklet T-7, Standard of California, San Francisco 20, California.



STANDARD OF CALIFORNIA

RPM DELO Oil has world-wide distribution under the names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Imperial RPM DELO, (CONCENTRATE)

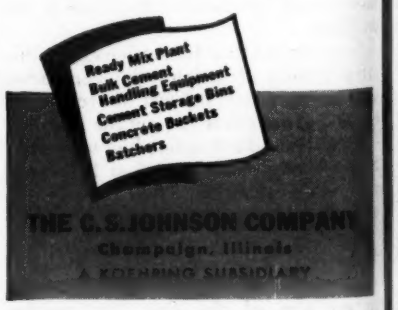
ON-THE-SPOT MIXING with a JOHNSON PORTO-BATCHER



Mix Where Needed . . . Saves Time, Tires and Labor

Johnson's Porto-Batcher is a complete, *portable* highway batching plant that provides fast, thorough on-the-spot mixing for many types of jobs — *wherever located.* It's compact, tows easily, erects quickly and meets all state highway requirements. *In addition to pavement work* PORTO-BATCHERS *are used as follows:*

- **As an auxiliary to a large ready-mix plant on large buildings, or bridge jobs, where distance from the main plant is a factor.**
- **By ready-mix operators who do not have a suitable site for a larger plant or who lack an established market for ready-mixed concrete in smaller communities.**
- **By general contractors who have a source of aggregate in construction of bridges, buildings and other concrete structures.**
- **By gravel producers interested in furnishing ready-mixed concrete for odd jobs or renting the machine to general contractors (along with the sale of aggregate).**
- **By road contractors who have occasional small street jobs or highway patching contracts.**



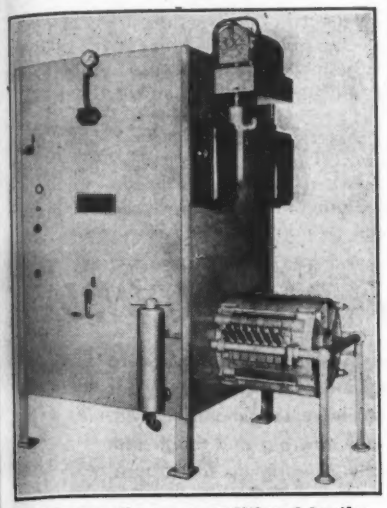
★ ★ ★ ★ ★ ★ ★

Victory Is Never Cheap in Lives or Money!

They're giving their all

Back them up with your Dollars by Buying War Bonds!

Buy Now—Buy More—MORE!



Crankcase oils are reconditioned by the contact process in a Hilco unit.

Oil Reconditioned For Fleet Operators

Oil purifiers which reclaim dirty crankcase oils are economical for contractors and highway departments operating large fleets of automotive equipment. The Hilco Airline oil purifier reconditions oil in batches, by heating and agitating it with a filter material, and then this absorbent material is removed by passing the oil through filter papers under pressure, removing all impurities. The units are made in various sizes ranging in capacity from 6 to 130 gallons per batch and operating at an average material cost of 2½ cents per gallon, depending on service conditions and requirements.

The Hilco unit operates by the contact purifying process. A motor drives a small vacuum pump which draws the dirty oil through a meter into the heater tank. Then Hilite or fuller's earth is drawn from a hopper by vacuum into the heater tank and the batch is heated automatically to an average temperature of about 400 degrees F for approximately one hour while the mixture is agitated. The filtering material absorbs tarry matter, carbon, abrasives, dirt, and acids, and all light ends, including water and fuel dilution, are vaporized by the heat and vacuum and condensed in a distillate tank, uncondensed vapors being exhausted to the outdoors.

When a batch has reached the proper temperature for the oil being treated, a discharge valve is opened and the oil flows by gravity into a run-down tank below from which it is discharged by air pressure through a multiple filter press which removes all of the solid contamination and filtering material. During the time the mixture is being filtered, another charge of oil and filtering material can be placed in the heater tank so that the equipment may be operated continuously.

Bulletin No. A-102 describes the operation of the purifiers in detail, with a diagrammatic cross section of a typical unit. Copies of this bulletin will be sent to readers who write direct to The Hilliard Corp., Inc., 102 W. Fourth St., Elmira, N. Y., and mention this illustrated news item.

New Export Manager Of Clyde Iron Works

John M. Metes, formerly of W. R. Grace & Co., New York City, has been appointed Export Manager of Clyde Iron Works, Inc., of Duluth, Minn. Mr. Metes has been associated with the Grace organization since 1937 and represented it in Chile, Peru, and other South American countries. He is a graduate of the University of Michigan and in 1930 joined the General Electric Co. in Schenectady, N. Y. In 1935 he became an engineer with the International General Electric Co.

Clyde Iron Works, Inc., is a subsidiary of Barium Steel Corp., New York, N. Y.

Shovel Manufacturer Tells Post-War Plans

A preview of what the construction, excavating, and materials-handling fields may expect in the way of Osgood equipment is provided in the post-war plans announced by The Osgood Co., Marion, Ohio, manufacturer of power shovels, cranes, draglines, and backhoes. The latest line of Osgood power shovels, available as soon as the green light flashes for civilian production, will include more than a dozen models ranging in capacity from ⅜ to 2½ cubic yards. All these rigs are reported to be well beyond the drawing-board stage, with pilot models already in the field on test. Although several units will be improved versions of well known pre-war Osgoods, most models embody entirely new principles of design, construction, and operation.

One of the featured units of the new line is a light-weight ⅜-yard shovel built of weight-saving materials, in line with consistent strength and durability, and crawler-mounted. A second new shovel is the 1-yard medium-weight unit embodying features conceived and proved during wartime construction.

The next heavier machine is equipped with a new type of crawler mounting and has a capacity of 1¾ yards. Also in production is a brand new 2-yard machine that will replace the Osgood Type 90. Of particular interest is the new Type 100 unit of 2½-cubic-yard capacity which will be available in three models. The standard unit is equipped with a manganese dipper, a 25½-foot boom, and an 18-foot handle. The same unit, equipped with a longer crawler mounting and with a boom up to 85 feet in length, will be produced as a dragline. The third version of the Type 100 will have a 2-yard manganese dipper and is a high-boom stripping shovel equipped with a 45-foot boom and a 35-foot handle.

Along with continued production of ½, 1¼, and 1½-yard rigs, announcement of the new models shows the extent of Osgood post-war planning.

PILE HAMMERS and EXTRACTORS

HOISTS—DERRICKS WHIRLERS

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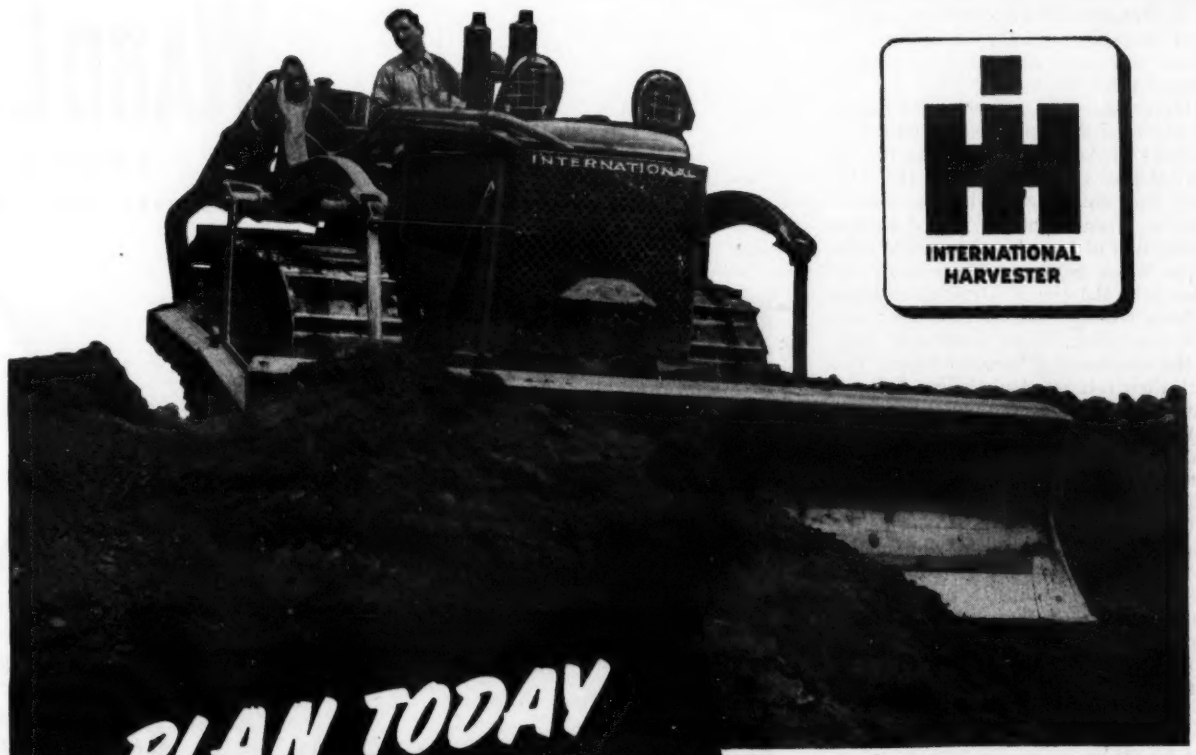
Special Equipment
Movable Bridge Machinery

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Write for descriptive catalogs

McKIERNAN-TERRY CORP.
19 Park Row, New York

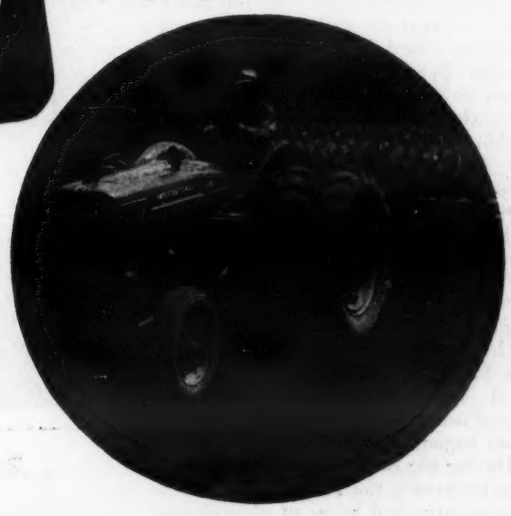
Distributors in Principal Cities



INTERNATIONAL HARVESTER

PLAN TODAY FOR YOUR POWER TOMORROW

Above: International TD-18 Diesel TracTracTor making a fill. Below: International TD-9 Diesel Wheel Tractor compacting a subgrade.



FOR YEARS International Power has been a partner in the achievements of the construction industry. When the Pacific war is finally won, and International Power is again available in needed quantity, it will play an important part in the great program of peacetime construction and reconstruction.

International Power includes TracTracTors, Wheel Tractors, and Power Units, both Diesel and gasoline. These time-tested, war-proved tractors and engines bear the stamp of International Harvester's years of engineering and manufacturing know-how.

Plan now for your postwar power needs, even though the Armed Forces must still be given the major share of current tractor and engine production. Let the International Industrial Power Distributor analyze those needs with you and recommend the particular kind and size of International Power equipment your work calls for.

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INTERNATIONAL POWER

AGC and AFL Agree On Post-War Program

Management and Labor to Solve Own Problems in Reconversion to Peacetime Economy Without Resort To Government Adjudication

✦ THE Associated General Contractors of America and the Building and Construction Trades Department, American Federation of Labor, have announced that an understanding has been reached between officials of the two organizations for the purpose of seeking to solve their mutual problems in the post-war period. The program includes provisions to:

1. Maintain and improve the present working relations in the industry.
2. Prepare a record of the points of agreement existing on a national basis.
3. Set up a joint committee to handle within the industry the various problems arising which cannot be dealt with locally.
4. Retain within the industry control over its problems rather than having to resort to Federal or state legislation or administrative action.

Harry A. Dick, Portland, Oregon, President of the Associated General Contractors of America, states that the understanding reached between the AGC and the Building and Construction Trades Department of the American Federation of Labor is the first of steps to be taken between management and labor with the aim of bringing about an orderly reconversion to peacetime construction work. Management and labor in the construction industry believe that with their intimate knowledge of the industry they are better qualified than anyone else to work out the problems which will arise in the post-war period between labor and management in construction.

Representatives of the two organizations met in Washington for the purpose of exploring the problems confronting the construction industry in the reconversion and post-war period and have arrived at the four-point program. The points of this program are general in nature at the present time. Details will be worked out by the committees of the two organizations, the membership of which will be announced later.

Cooperative Action

Formal relations between the Associated General Contractors of America and the Building and Construction Trades Department date from the autumn of 1939 when the Executive Council of the Department met with the AGC Labor Relations Committee in Atlantic City and formulated a program for improvement in handling of jurisdictional disputes, to prevent stoppages of work.

Following this meeting, negotiations were carried on by joint committees working towards the development of certain standard procedures which, if approved, could have been recommended by the organizations to their respective bargaining groups for inclusion in local agreements. These negotiations ceased when the war construction program began.

During the defense and war construction programs, the Federal government was the principal buyer of construction. It controlled all construction, and regulated all labor relations in construction. During this time the AFL Department made an agreement with the Federal government, and offered important concessions in overtime pay and working conditions, and stabilized wages on government contracts.

A peacetime economy now is developing rapidly. Even though certain wartime conditions will continue, it is time to start returning to a normal peacetime basis. For that reason, representatives of the two organizations have met to start preparing for the return of normal employer-employee relationships during the reconversion and post-war periods.

Construction is the largest major industry which will be able to turn quickly to peacetime work. It is being looked upon by the nation to furnish a large volume of employment during the reconversion period and to execute a volume of work in the post-war period of about 10 per cent of the national economy. The relationships between labor and management must be such that this work may be undertaken without any loss of efficiency due to labor-management problems. These facts form the background for the meeting which has been held and for the joint announcement which has been made. By taking this step, both labor and management in construction in effect pledge to the public that they will take the responsibility for working out their joint problems efficiently and intelligently.

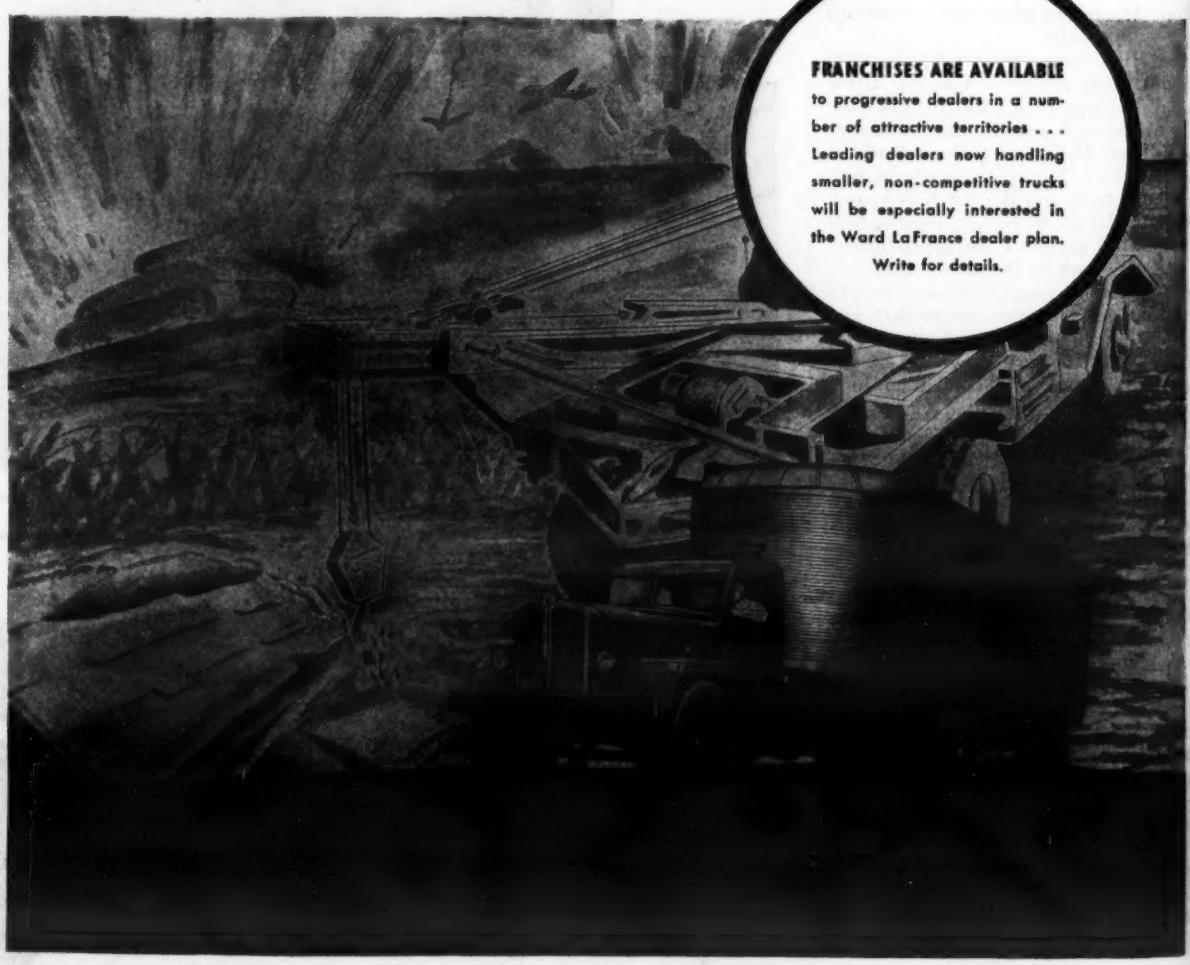
Safety information which does not inform, counsel, warn, stimulate, remind, instruct, or reiterate for the purpose of training the mind for accident prevention is innocuous and of no value.

THE TRUCK WITH THE BATTLEFRONT BACKGROUND

● One of the battlefront jobs of the Ward LaFrance Heavy Wrecker, M1A1, is to move in under the very nose of the enemy and remove damaged tanks and other vehicles to a repair base where they can be put in fighting condition again. The M1A1 has performed amazing feats, under the worst possible operating conditions, on all major fronts, where human life depends on *performance*.

Building such good trucks is not new to Ward LaFrance, but our new commercial models, inspired by the outstanding record of this 6x6 Ordnance vehicle, are by far the best trucks we have ever manufactured. Like the M1A1 they are big and tough with pay load capacity ranging up to 30 tons. They're the trucks with the "battlefront background"... designed, engineered, and manufactured for low-cost hauling. Now available to essential users. See your local Ward LaFrance dealer. If there is no dealer in your locality, write direct.

WARD LAFRANCE
TRUCK DIVISION
GREAT AMERICAN INDUSTRIES, INC. • ELMIRA, NEW YORK



FRANCHISES ARE AVAILABLE to progressive dealers in a number of attractive territories . . . Leading dealers now handling smaller, non-competitive trucks will be especially interested in the Ward LaFrance dealer plan. Write for details.

Sea Going



Certain types of Owen Buckets have grit-tight bearings, special lubrication and other features to adapt them to underwater digging and assure long life under this difficult service.

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6030 Breakwater Avenue • Cleveland, Ohio
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OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

Bridge Inventory Is Kept by County

Visible Card File Shows All Data on All Bridges; Post-War Rehabilitation Considered Postponed Job

By W. H. BEHRENS, County Engineer, Linn County, Iowa

♦ THE 476 bridges, 1,063 concrete box culverts, 294 corrugated-metal pipe culverts, and 93 miscellaneous drainage structures in Linn County, Iowa, were first inventoried in 1929 by the present County Engineer; then in 1939 a visible card file was installed and in 1940 a valuation survey was made so that now the file is a perpetual inventory of engineering data and maintenance costs for each bridge or drainage structure. On this inventory the post-war rehabilitation program has been predicated, but is considered really as postponed construction and maintenance.

Bridge Care

The county bridges and drainage structures in Linn County are divided among various types as shown in the following table:

Type	No.	Total Length
Iron and steel truss bridges	104	11,472 feet
Concrete bridges	11	290 feet
I-beam bridges	67	2,615 feet
Treated-timber trestles	153	4,082 feet
Untreated-timber trestles	161	4,818 feet
Concrete box culverts	1,063	
Corrugated-metal pipe culverts	294	
Fords	3	
Miscellaneous structures	90	

Minor repairs to bridges are made by the four district maintenance crews, each of which is in the charge of a foreman. Major repairs are made by the county bridge crew which consists of a foreman with a normal complement of five men. This crew constructs timber trestles and minor structures which generally cost under $1,500. The equipment for the bridge crew includes a 2-ton truck with trailer, swinging leads on a Speeder ½-yard crane, and a Caterpillar Twenty with a two-drum hoist and a pile-driving rig for use on land.

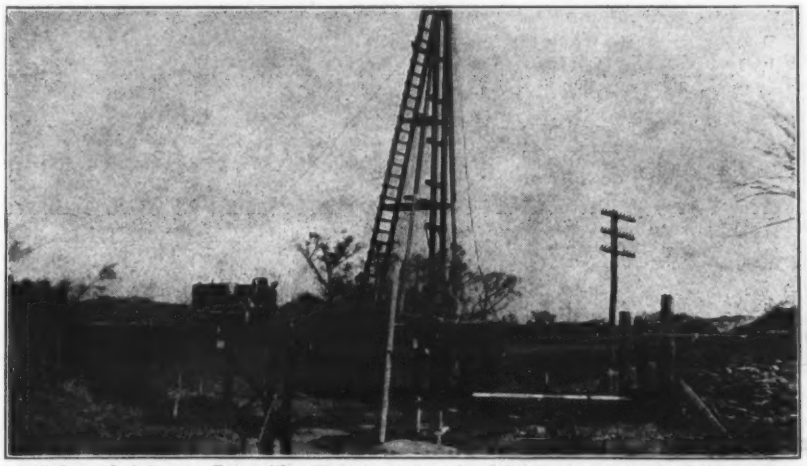
County Highways

The county highway system consists of 212 miles of trunk roads and 1,043 miles of local roads within the 720 square miles of the county. The surfaced roads are divided, according to types, as follows:

Crushed limestone	757.0 miles
Bituminous surface-treated	2.4 miles
Mixed bituminous	1.6 miles
*Concrete	7.7 miles

*Concrete roads are former state primaries which have been relocated.

The county has a total population of 89,142, of which 62,120 are at the county seat of Cedar Rapids where road-equipment manufacturing has crowded the grain and food-processing plants for first place. Cedar Rapids claims the largest cereal-processing mill in the world, the Quaker Oats plant. Like the rest of Iowa, Linn County looks upon agriculture as its most important industry, with the production and feeding of livestock predominating. The county is located in east-central Iowa, in the Iowa and Kansan glacial drift area with generally rolling to rough terrain. There are two meandering rivers and several large creeks in the county.



A 2-drum hoist on a Caterpillar Twenty and a pile-driving rig are part of the equipment used by the Linn County bridge crew in the construction and maintenance of county structures.

Roadway Maintenance

For maintenance purposes, the county is organized in four districts with a foreman in charge of each. The normal pre-war maintenance personnel was sixty-five men but this has decreased to approximately forty-five at the present time.

The equipment used for the maintenance of both trunk and local roads includes: 16 Caterpillar diesel power graders; 5 Caterpillar D7 tractors; 3 Tracksons shovels mounted on Caterpillar tractors; 30 GMC, Ford, and Chevrolet 1½-ton trucks; a Walter Snow Fighter; a Speeder ½-yard convertible shovel and dragline; 2 Caterpillar elevating graders; a Cedarapids portable stone-crushing plant; 2 LaPlant-Choate bulldozers; 2 LaPlant-Choate tractor snow plows; and a LaPlant-Choate Carrimor 8-yard scraper.

Central and District Garages

For the maintenance and storage of equipment, Linn County has a central garage in Cedar Rapids, a brick building 128 x 48 feet fully equipped with shop tools and maintenance machinery. There is 14,000-gallon capacity in un-

(Concluded on next page)

SAVE 50% ON FUEL AND WAITING TIME when Heating & Melting Tar & Asphalt



USE AEROIL THE FAMOUS HEET-MASTER

55, 80, 115 and 165 gallon sizes on skids, on steel wheels and on pneumatic tires. Send for FREE Bulletin No. 350CE (specifications, prices, etc.)

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Hard-Faced FOR A TOUGH JOB

SLUGGING IT OUT WITH HEAVY SHALE, three pieces of Consolidated Rock Products Co. equipment swing at the combined rate of 550 "bites" per hour in one of their Western quarries. Abrasive action of granite concentrate in the pit caused frequent replacement and resurfacing of bucket and drag teeth. To solve this problem Consolidated weldors laid 3/16-inch caps of easy-flowing MIR-O-COL No. 2 hard-facing metal over these parts. Equipment maintenance costs dropped rapidly. Today records show that these buckets are productive in 300-hour stretches before new deposits of hard-facing are required. This metal can make your equipment last longer. Write for the name of your nearest distributor.



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TO SECURE YOUR FREE COPY of the "Weldor's Guide to Successful Hard-Facing," write to MIR-O-COL ALLOY Company. Give your home address if you wish to be put on the MIR-O-COL News monthly mailing list.



FREE

County Road Work

(*Continued from preceding page*)

derground tanks for the storage of both diesel fuel and gasoline. All major repairs to county equipment are made at this shop by the foreman and four mechanics and helpers.

In addition to the central garage there are four frame district garages located at Deweyville, Mount Vernon, Marion, and Center Point for storage and minor servicing. Eleven frame storage garages are scattered about the county for patrolmen.

Post-War Plans

In the post-war plans of Linn County no reorganization of the County Highway Department is contemplated. It is expected that there will be considerable highway grading and surfacing as prescribed by the Iowa Bergman Law. Approximately 50 miles remain on the present county program for construction as soon as conditions permit. Post-war plans stress the consolidation of road surfaces by special maintenance as well as a construction and reconstruction program of about $300,000 for bridges.

The first item of purchase which the County plans to make will be new trucks.

Personnel

The Board of Supervisors of Linn County is comprised of three members elected by districts for three-year terms which are staggered with an election every two years. The present Board consists of Clare Petty, Chairman, Clarence L. Beeson and Elmer M. Seevell.

The County Engineer is appointed for a term of from one to three years and the present incumbent has held the position since 1928. The County Highway Department is operated entirely on the unit system.

Clarence L. Beeson is a past vice president of the Iowa Supervisors' Association, and the County Engineer is a past president of the State County Engineers' Association.



Made in the county seat, this Cedarapids Duplex portable crushing plant and Speeder ¼-yard shovel are used by Linn County, Iowa, to prepare limestone for road work.

Asphalt Road Work Using Distributors

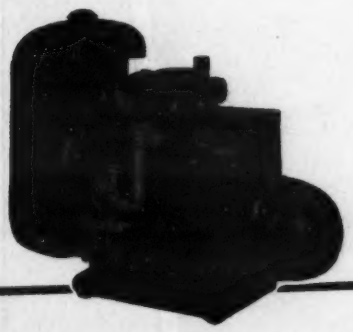
A new 24-page booklet which contains step-by-step descriptions of those types of asphalt road and airport construction in which the asphalt is applied by truck-mounted pressure distributors has been prepared by The Texas Co., 135 E. 42nd St., New York 17, N. Y. The booklet gives the details on the construction of standard and modified types of asphalt penetration-macadam paving, describes the road-mix methods of building low-cost asphalt surfaces, and outlines the proper procedures for surface-treating roads with liquid asphalt surfacing materials, asphalt cement, and emulsified asphalt.

The book concludes with three pages of useful tables on the amount of asphalt and aggregates needed for a mile of road and other data of help to the road builder. The final two pages are devoted to detailed instructions for unloading asphalt from steam-coil tank cars.

Copies of this booklet will be sent promptly to readers of CONTRACTORS AND ENGINEERS MONTHLY who write to The Texas Co. and mention this review.

Detrex L. A. Office Moves

The Pacific Coast offices of the Detrex Corp., Detroit, Mich., manufacturer of degreasing solvents and metal cleaning machines, are now established at 318 W. Ninth St., Los Angeles, Calif. The new offices, under the supervision of S. R. Crooks, Pacific Region Manager, offer larger facilities as sales and service headquarters of the company in the Pacific Coast and Rocky Mountain states.



ELECTRICITY

For All Contracting and Engineering Projects

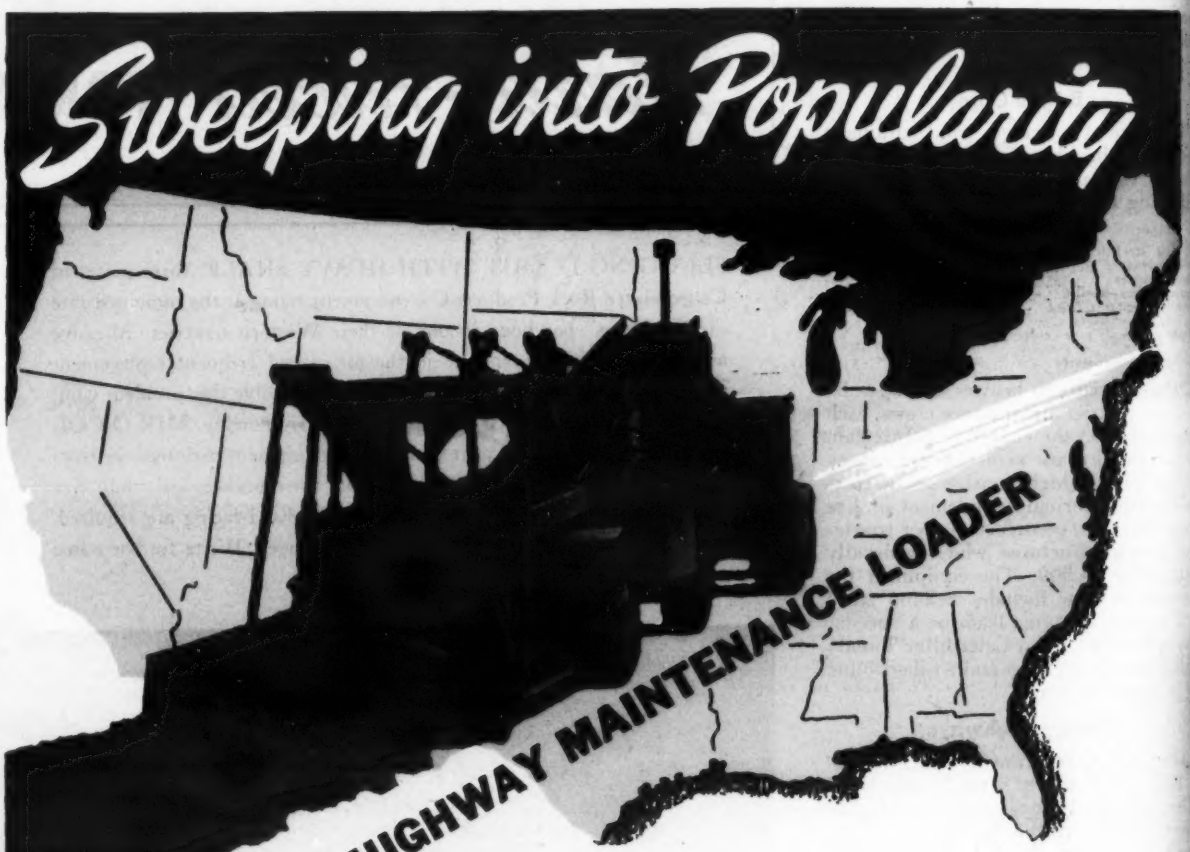
• ONAN ELECTRIC GENERATING PLANTS supply reliable, economical electric service for engineering and contracting uses as well as for scores of other general applications.

Driven by Onan-built, 4-cycle gasoline engines, these power units are of single-unit, compact design and sturdy construction. Suitable for mobile, stationary or emergency service.

Models range from 350 to 35,000 watts. A. C. types from 115 to 600 volts; 50, 60, 180 cycles, single or three-phase; 400, 500, and 800-cycle, single-phase; also special frequencies. D. C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

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1248 Royalston Ave.
Minneapolis 5, Minn.

ELECTRIC PLANTS Onan



With wartime maintenance crews shorthanded and urgent jobs crying for attention, highway departments in ever-increasing numbers are looking to Athey Force-Feed Loaders to solve manpower problems and speed maintenance work.

You'll welcome the fast, clean loading job now possible with this new, modern tool. A companion unit for your "Caterpillar" Motor Grader, this self-propelled, one-man operated loader gathers up windrows of surplus material, removes it from the highway, and loads it into trucks for disposal or salvage.

Here are just a few of the many uses you'll find for Athey Force-Feed Loaders in handling surplus material on maintenance work: Ditch cleaning, Road grading, widening and straightening, building and relocating ditches, and dressing slopes.

You'll save time and manpower . . . do more work . . . by replacing hand or other slow and expensive methods, with Athey Force-Feed Loaders. Ask your Athey-"Caterpillar" dealer for complete details, or write direct to Athey Truss Wheel Co., 5631 West 65th Street, Chicago 38, Illinois.

Athey DEPENDABLE LOADING & HAULING EQUIPMENT



Construction Authority Created by Pending Bill

The establishment of a Public Service and Development Authority with power to build roads, airports, docks, and other projects outside the limits of the Port of Boston is recommended in a bill reported favorably by the Legislative Committee on State Administration of Massachusetts. The proposed projects would be self-supporting and would be administered by the proposed Authority, which would consist of the State treasurer and four persons appointed by the Governor, with the provision that not more than three of the five members could belong to the same political party. Members of the proposed Authority would receive $30 for each meeting attended, with a yearly limit of $5,000 in pay for each member.

Catalog on Blaw-Knox Construction Equipment

A new 12-page booklet, handily indexed and well illustrated, provides quick reference to the Blaw-Knox line of equipment for concrete construction and highway and airport paving. Steel street forms, self-aligning forms, finishing machines, paving spreaders, bins and batchers, concrete buckets, and tamping rollers, in a variety of styles and sizes, are described as to construction, operation, and use. This information is supplemented by tables, diagrams, and photographs of the different units and complete assemblies. Two pages are devoted to listing the weights, capacities, and dimensions of various types of clamshell buckets, with suggestions for the selection of the proper bucket for the job. Complete specifications for all equipment described are included in the booklet.

Copies of Bulletin No. 2036, as well as complete catalogs on individual pieces of equipment, may be secured by interested contractors and engineers by writing direct to the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh 22, Pa.

New Cataphote Dealer

The Cataphote Corp., Toledo, Ohio, manufacturer of reflector buttons and traffic signs, has appointed T. E. Potts Equipment Co., Kenmore, N. Y., as its distributor in Niagara, Orleans, Monroe, Erie, Genesee, Livingston, Wyoming, and Chautauqua Counties in western New York State.



Some of the diversified "Caterpillar" Diesel equipment of the Dutcher Construction Corp. (Queenstown, Md.) working on airport, reservoir, army camp, and munitions plant projects.

HIS customers are among the largest in the country. He can go anywhere. Tackle any size contract. And always beat or come close to his monthly yardage estimate . . . because—

He knows he has the right equipment. Knows what it can do. Knows that well-balanced variety enables him to *zone* his equipment for both long and short hauls—for shrewdly planned operation that means *lowest costs on earth.* He knows, too, that there's quick, sure, efficient mechanical and replacement-parts service always near at hand to keep all his machines in tip-top working condition.

In other words, the Dutcher Construction Corporation has reduced contracting guesswork and uncertainties to a minimum by STANDARDIZING on rugged, dependable, versatile and economical "Caterpillar" Diesel equipment all along the line. "In fact," writes Mr. Dutcher, "we have been 100% standardized on 'Caterpillar' equipment since before it was even known as such, prior to 1925."

"A great many of our jobs," continues Mr. Dutcher, "have run 24 hours a day, 7 days a week; and with the 'Caterpillar' equipment, there has been surprisingly little down time for repairs. In the few cases where we had to rent additional equipment of other makes, our operating cost records have shown that its upkeep greatly exceeded that of our own."

In dozens of ways, *it pays to* STANDARDIZE *on "Caterpillar" Diesel equipment.*

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

• The Dutcher Construction Corporation owns and operates 34 pieces of "Caterpillar" equipment—composed of D8 and D7 track-type Tractors, DW10 Wheel Tractors, Motor Graders, Elevating Graders, and Diesel Electric Sets. "Caterpillar" Diesel Engines also power the cranes they use.

CATERPILLAR DIESEL

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ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

The discharged veteran wears this emblem. Remember his service and honor him.

Pavement Raised At Grade Crossing

State Day-Labor Forces Mud-Jack Concrete Slab 4 Inches to Meet New Grade Of Railroad Tracks

✦ WHEN the Wabash Railroad raised its grade recently during improvement to the roadbed by deepening the ballast under the ties on the tracks northeast of Springfield, Ill., it was necessary to raise the grade of the highway which intersects the railroad at that point. Otherwise there would have been an unsafe bump for motor vehicles to pass over at the grade crossing. The work was done by the State Division of Highways and was paid for by the railroad company.

The highway in question, State-Aid Route 3 which is a connection between U. S. 66 and U. S. 36, the route to Decatur, is an 18-foot concrete pavement of 9-6-9-inch section built in 1928. To meet the new grade of the railroad, it was necessary to raise the concrete pavement 4 inches on either side of the track and feather off this increase in height to zero 75 feet back from the rails, which was considered sufficient distance to provide a smooth approach to the crossing.

The job of raising the concrete slab was performed by a day-labor force of eight men, including the foreman, by forcing "mud" under the slab until the desired grade was reached. Holes were drilled in the pavement with a jackhammer using 2⅝-inch bits and powered by a Worthington air compressor mounted on a GMC truck and driven by the power take-off from the truck engine. The holes were driven in two rows along each half of the pavement, one row 6 inches from the center line and the other row 6 feet away, or 30 inches in from the side of the pavement. These two rows of holes were staggered but their 6-foot spacing was the same for each row.

Earth and Cement

The pavement was raised by forcing a mixture of earth, cement, and water through the holes, which produced an action like a hydraulic jack. The water for the mix was also carried on the GMC truck in a 500-gallon tank, while the earth and cement were hauled in a 2½-ton International truck. The remaining piece of equipment, the Mud-Jack, is mounted on four rubber-tired wheels and was towed by one of the trucks. The earth used was a topsoil from which all roots, weeds or other material that might stick in the nozzle was removed.

About 2 cubic yards of the earth was spread out over the back of the truck and covered with two sacks of cement. Two men, standing on the floor of the truck, shoveled this mixture into the hopper of the Mud-Jack which had been placed at the rear of the truck. Shoveling was done so as to mix the cement uniformly with the soil while water from the tank truck was delivered to the hopper through a hose line. The machine then pumped the mixture through about 40 feet of hose to a 4-inch tapered nozzle, the end of which fitted snugly into the 2⅝-inch holes. A splash pan, 1 foot in diameter, fitted over the end of the nozzle, served the double purpose of preventing the mud being splashed around in case too much pressure was built up beneath the slab and blew the mud back through the inlet hole, and also as a bearing plate on which the nozzle man stood during the pumping to keep the nozzle in place.

An operator was on constant watch at the Mud-Jack to shut it off instantly in case of a block in the line, and to control the flow of mud through any one hole. More mud naturally had to be pumped under the slab near the tracks where the greatest rise was necessary, and less mud was pumped further back where the increase in height was slight. Care was taken so that the slab was raised no more than ⅛ inch at a time to avoid cracking of the concrete by lifting it too much in some places and leaving it unsupported in others. Consequently the nozzle was constantly being shifted around from hole to hole, pumping a little at a time in each in order to obtain a gradual increase in height. When the road had attained the required profile, from 0 to 4 inches in 75 feet, the pavement on the other side of the track was raised in a similar operation.



C. & E. M. Photo

A seven-man Mud-Jack crew make a highway grade meet a new railroad grade.

Personnel

The distribution of the seven-man day-labor force under H. W. Ewing, foreman, was as follows: two men loading material into the Mud-Jack, an operator of the Mud-Jack, two men working the nozzle and shifting the hose, a man cleaning surplus mud off the road and plugging the holes with wood stoppers until they could be filled with concrete later, one man driving a truck and also operating the air compressor and the water feed line, and the foreman who drove the second truck.

This pavement-raising operation of the Illinois Division of Highways, Wesley W. Polk, Chief Engineer, and C. W. Ross, Engineer of Maintenance, was done in District 6 of which Carl M. Wahl is District Engineer, with headquarters at Springfield.

Peak Performance



CP PORTABLE COMPRESSORS

Design refinements in CP Portable Compressors assure 15% to 35% more air per gallon of fuel. Speed varies with air demand — not by steps, but gradually — resulting in marked fuel economy and reduction in wear. CP Portables are available in gasoline-powered models of 60, 105, 160, 210 and 315 c.f.m.; and in Diesel-powered sizes of 105, 160, 210, 315 and 500 c.f.m.



CP CLASS O-CE STATIONARY COMPRESSORS

Ruggedly built and conservatively rated, CP Class O-CE Horizontal-Duplex Motor-Driven Air Compressors meet every requirement of heavy-duty, day-after-day service. They are available in capacities up to 10,000 c.f.m. Other CP Stationary Compressors are also available in vertical and horizontal designs for steam, belt and electric motor drive in a wide variety of capicities and pressures.

CP-42 SINKER DRILL



Fast drilling speed, strong rotation and good hole-cleaning qualities make the CP-42 Sinker the preferred tool for shaft sinking, quarry drilling, general excavation and road work. Low air consumption makes it particularly suited for portable air compressors.

CP-115 DEMOLITION TOOL



Weighing only 59 lbs. with latch type retainer and 55 lbs. with spring type, gives outstanding performance for a medium weight tool. Valve-actuated, it operates smoothly with minimum kick back. Full cushioning eliminates need for side rod springs — protects the head from punishment in "breaking through." Gooseneck air inlet prevents the operator's hand from catching in swing of hose.



CP-116 SHEETING DRIVER

Essentially the popular CP-116 Demolition Tool with a special front head for driving sheet piling. CP Sheeting Driver has only one moving part, the piston, which strikes a fast powerful blow. As it does not "broom"—sheeting can be used over and over.

Drainage Ditcher Is Once Again Available

The Buckeye Model 1 drainage ditcher is back in limited production and is rolling off the assembly line, under authorization by the War Production Board. Until recently, all ditcher production by the Buckeye Traction Ditcher Co. had been limited to certain models which have been required in large numbers by U. S. Army Engineers for use in all parts of the globe.

The Model 1 is designed for light ditching for shallow drainage systems, and moves forward as the wheel rotates, cutting a clean straight-sided trench in any type of soil. Variable cutting or digging speeds range from 3 to 9½ feet per minute. "All-purpose" buckets have interchangeable knife-edge cutting lips and rooting teeth, and the bucket bottoms are removable for digging in wet, adhesive, or gumbo soils. Power is furnished by a 6-cylinder medium-speed heavy-duty gasoline engine. The manufacturer states that the introduction of this machine some years ago did much to break the drainage-cost bottleneck by digging trenches at a fraction of the cost of manual digging.



The Buckeye Model 1 drainage ditcher is once more in limited production.

Bulletin 4B-114, picturing and describing the Buckeye Model 1, may be secured by interested contractors and highway engineers direct from the Buckeye Traction Ditcher Co., Findlay, Ohio. Just mention this item.

Large Swedish Airport

Vasby, near Stockholm, has been recommended by the Airport Investigation Committee as the location for Sweden's large airport terminal for long-range operations. Tests of the Vasby soil have been made, and it is proposed to construct reinforced-concrete runways at this new airport.

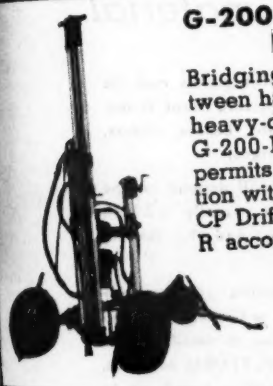
..WITH GREATER SPEED ..AND LOWER COST !

For over 45 years, contractors in all parts of the country have looked to CP for plus performance in Air Compressors, Rock Drills, Pneumatic Tools and other equipment. In today's man-power shortage, the efficient, trouble-free, easy operation of CP equipment is of special importance. Geared to give maximum service with minimum maintenance, CP equipment is the choice for increased profit now — and in postwar construction. Ask for a copy of Catalog No. 600, giving complete information concerning CP line of contractors equipment.



G-200-R WAGON DRILL

Bridging the gap between hand sinkers and heavy-duty CP G-500, G-200-R Wagon Drill permits one-man operation with most powerful CP Drifter Drills. G-200-R accommodates 6-foot steel changes; 18 to 24-foot steels are easily handled.



CP SUMP PUMP

For removing water from manholes, ditches, tanks or pits quickly and cheaply. Requires no priming. CP Sump Pumps will operate from any air compressor delivering 100 or more cubic feet per minute.



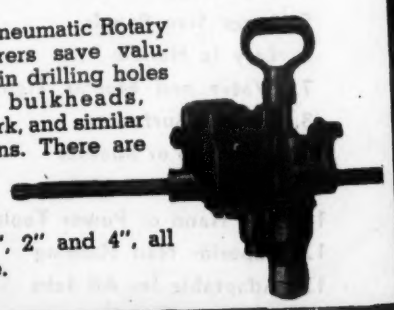
CP BACKFILL TAMPERS

In trench work particularly, CP Backfill Tampers quickly earn their cost by saving the time and labor involved in hauling surplus excavated material. For general tamping, CP-3 is recommended; for heavy tamping, CP-MM; for extremely heavy tamping, CP-4.



CP ROTARY WOOD BORERS

Chicago Pneumatic Rotary Wood Borers save valuable time in drilling holes in piers, bulkheads, trestle work, and similar applications. There are three sizes of CP Wood Borers, 1", 2" and 4", all reversible.



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CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

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AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

Lengthening the Life Of All Grader Blades

Hard-Surfacing Alloys Add Months And Miles of Service When Properly Applied to Scraper and Grader Blades: Methods and Cautions

✦ IN view of the continued shortage of steel, hard-facing as a means of reclaiming and extending the life of worn blades of road graders and scrapers as well as ditcher and scarifier teeth and road plows is proving of more and more value. With the Pacific war increasing in activity, we cannot look to much easing of the steel situation for at least another year; therefore, a careful study of methods of lengthening the life of grader blades is well warranted.

Hard-Facing With Electric Arc

Where the electric arc welding method is used with a hard-surfacing rod, the following procedure is recommended for hard-facing grader blades. The blade should be cleaned by grinding a strip from 1 to 3 inches wide along the entire length of the cutting edge of the blade. To assure an unbreakable bond between the hard-facing and the blade, with a minimum of porosity, the blade must be free from all dirt or mill scale.

To prevent warping during the hard-facing operation, either bolt two blades together or build a backing plate to which the blade can be bolted, or clamp the blade firmly to a steel welding bench.

Before starting the hard-facing application, the blade edge should be preheated to about 1,500 degrees F, or a dull cherry red, and this heat should be maintained constant during the entire hard-facing application. One of the best methods to accomplish this is to rig a long gas pipe beneath the blade, with a row of jet outlets at the proper distance to maintain the heat.

The arc welding machine should be set high enough to run the hard-facing rod red and then the alloy from the rod should be applied with a circular motion. The electrode should be held at a 45-degree angle to the blade. The hard-facing should be applied from 3/16 to ¼ inch thick, always on the face of the blade, and from 1 to 3 inches wide.

There are some welders who have had success in hard-facing pieces of equipment by "cold" welding and without preheating. In this case, a skip welding procedure is followed, applying from 6 to 9 inches at each end of the blade, then a similar distance skipped and the welding continued for another 6 to 9 inches. Clean the surface of the application with a wire brush to remove all scale and slag before tying together the beads of the skip welds.

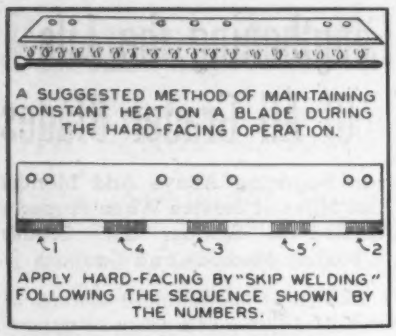
After this is done the stress set up in the blade should be relieved and the blade brought back to normal by placing it in an oven and raising the temperature slowly to between 800 and 1,000 degrees F. Then turn off the heat and allow the blade to cool in the quiet air within the oven. If no oven is available, the blade can be heated evenly with a torch and then covered with sand or lime to permit slow cooling.

In hard-facing by electric welding, always use a long arc. This results in a wide dispersal of the heat over an area many times the diameter of the electrode, melting the parent steel surface with slight penetration. Deep penetration causes excess local upsetting.

The use of a circular motion helps to preheat the metallic area immediately ahead of the hard-facing deposit. It also keeps the shallow hard-facing puddle in a fluid stage long enough to raise all the impurities to the surface, allowing the hard alloy to settle into a smooth, solid deposit, free from porosity.

In general, the metallic arc process is

(Concluded on next page)



A SUGGESTED METHOD OF MAINTAINING CONSTANT HEAT ON A BLADE DURING THE HARD-FACING OPERATION.

APPLY HARD-FACING BY "SKIP WELDING" FOLLOWING THE SEQUENCE SHOWN BY THE NUMBERS.

Lengthening the Life Of All Grader Blades

(Continued from preceding page)

more economical for hard-facing applications. But where the acetylene welding process is the only one available, the following procedure should be followed.

Hard-Facing With Acetylene Flame

For hard-facing a grader blade by means of an oxygen and acetylene flame, use a tip that will give a soft bulbous flame. Hold the torch so the brush of the flame strikes the work at a 45-degree angle, thus preheating the area ahead of the deposit. The flame must bring the surface to the melting point without forming oxides. When enough carbon gas is present in a long brush flame, the oxygen in the surface oxides of the parent metal will be reduced to iron. With the hard-facing alloy remaining fluid longer than the base metal, all of the impurities are free to float to the surface as the deposition proceeds.

Benefits of Hard-Facing

Two benefits are obtained when hard-facing is applied to edging, cutting or scraping surfaces on excavating or other earth-moving equipment. In addition to the longer life of the edge itself, with continuous, uninterrupted service, there is a saving of the time usually lost for sharpening due to the self-sharpening action of the hard-faced portion of the blade. Since the softer parent metal underneath the hard-facing tends to wear away much faster than the hard-facing itself, grader blades treated with a protective layer of ferritic high-alloy hard-facing stay sharp automatically.

W. Wesley Mills, Director of Research of Mir-O-Col Alloy Co., Los Angeles, Calif., has developed a production rod known as Mir-O-Col No. 2 which has a deposited Rockwell C hardness of 54 to 57, a melting point of 2,500 degrees F, a tensile strength of 45,000 pounds per square inch, and high red hardness. The hardening properties of this rod are obtained from metal carbides in sufficient quantity to give the alloy high rigidity with resistance to galling and abrasion. To provide this same resistance at elevated temperatures, the best results have been obtained by including two metals of the chromium group, in conjunction with either nickel, cobalt, or iron, with the carbon content above 3.75 per cent in carbide form.

Allis-Chalmers Announces Tractor Sales Changes

Several new appointments to key positions in the sales organization of the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis., have recently been announced. Marshal L. Noel, previously Industrial Sales Manager and long identified with the company's crawler-tractor and road-machinery sales, has been made General Sales Manager of the Tractor Division.

William J. Faulkner, formerly Manager of the Tractor Division's Washington, D. C., office, becomes Industrial Sales Manager, with F. B. Harrison, formerly Territory Sales Manager, and E. G. Kullman, as Assistant Industrial Sales Managers.

Ernest Franks has been placed in charge of wheel tractor sales for industrial purposes, in addition to his former duties as Manager of Power Unit Sales, and Boyd S. Oberlink, until recently an Assistant Industrial Sales Manager, is now Assistant to the Vice President, Tractor Division.

Dragline-Bucket Catalog

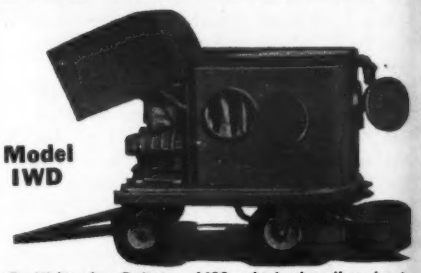
The Yaun all-welded dragline bucket, of basket construction with flat bars instead of sheet steel to permit the escape of water from the load, thus eliminating retarding suction when digging sticky dirt, is described and shown in diagrams in an 8-page catalog just received. The catalog also shows a shell-type all-welded bucket, said to be about one-third lighter than any bucket of similar capacity. Both types are equipped with Stellited lip, and tooth bases and removable tooth points made by the American Manganese Steel Co.

Copies of this catalog may be secured upon application to the Yaun Dragline Buckets & Mfg. Plant, P. O. Box 1508, Baton Rouge, La., and mention of this review.

What YOU SHOULD KNOW ABOUT

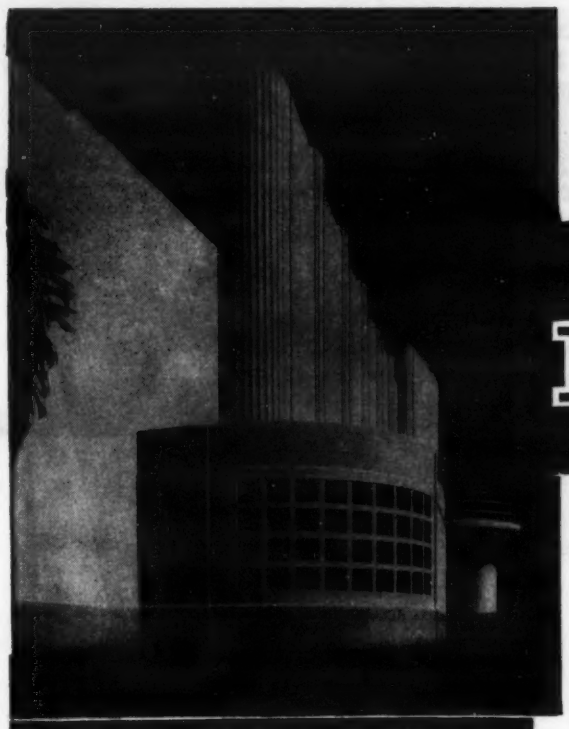
MARKLEY-CARTER Portable DUST COLLECTORS "Collects and Controls"

1 Portable units operate through powerful air stream by an effective double separation principle. No dust escapes into the air. Reduces SILICOSIS hazard to safe hygienic limit.
2 When applied to rock drills, SPEEDS UP DRILLING TO 33 PERCENT. Drill steel cuts into fresh rock unimpeded by dust or chips. PROLONGS LIFE OF DRILL STEEL. REDUCES SHARPENING COSTS.
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5 Equipped with Markley-Carter disposal container which permits continuous collection and disposal without closing down the system.



● Write for Bulletin 4402 which describes in detail the advantages of using MARKLEY-CARTER DUST COLLECTOR in your quarry and plant.

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192 ATLANTIC ST., HACKENSACK, N. J. 53 PARK PL., N. Y. 7, N. Y.



The Design and Construction of Plywood Concrete Forms — *utilizing*

PLYFORM

... the universally — standard, multiple-use concrete form material

Douglas fir plywood PLYFORM panels may be used for a wide variety of concrete form items, including walls of all kinds, slabs, beams, girders, and curved or architectural designs.

Thickness of the PLYFORM will depend on the loads, the permissible deflection (usually 1/270th of the span between supports), and the spacing of studs, joists or stiffeners.*

In building up panels, a simple jig for ready spacing of studs and stiffeners will save time and labor. Nails for forms should be as small and as few as practicable. For nailing PLYFORM to studs, use nothing larger than a 5d nail in panels up to 5/8" thick . . . a 6d nail for 3/4" panels. Lining plywood, 1/4" thick, is applied with 2d nails. Whenever possible—and especially when panels lap at corners—the use of double-headed nails will facilitate stripping and minimize destruction.

The construction of curved surfaces, joints and ties, and suggestions on the care and storing of PLYFORM forms will be covered in subsequent advertisements in this magazine.

PLYFORM

Write the Douglas Fir Plywood Association, engineering department, for technical data on the use of PLYFORM for concrete forms. All information is sent free to any point in the United States.

PLYFORM offers these advantages:

1. Water Resistant Glues
2. Grade and Trade Marked
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4. Numerous Re-uses
5. Large Size Panels
6. Easy to Handle
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8. Smooth Surfaces
9. No Warp or Buckles
10. Sheathing and Lining
11. Use Hand or Power Tools
12. Superior Nail Holding
13. Adaptable for All Jobs
14. Puncture Proof

Every panel of PLYFORM carries a distinctive green edge-sealing and the "grade trade-mark" shown below. Douglas fir plywood is available today on priority. Application for allocation must be made by the supplier to the War Production Board.

GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D. F. P. A. INSPECTED

*PLYFORM panels are manufactured with highly water-resistant glues and made in widths from 12" to 48", in even foot lengths of 4 to 8 feet inclusive, and in thicknesses of 1/2", 9/16", 5/8" and 3/4", with special 1/4" form lining plywood offered for curved surfaces, etc. Tables giving safe working stresses are available to enable the designer to determine sizes and spans.

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

New Ditch Linings To Prevent Erosion

Prompt Removal of Water At Toe of Slope Necessary To Check Erosion of Bank; Rigid vs Flexible Linings

IT is common knowledge that the faster water runs in a channel, the more aggressive is the erosion. Eroded ditches are not only unsightly but, in advanced stages, become definite traffic hazards. Erosion not only deepens the ditch but materially reduces the width of the shoulders and in many cases undercuts slopes, causing slides. All of these elements increase maintenance costs.

Several methods of stabilizing ditches are in vogue. This, literally, changes a ditch to a gutter. In a well constructed gutter, surface water flows freely in a defined area, causing no erosion, sloughing of shoulders, or inundation of slopes. Theoretically, there are two types of gutters, the rigid and the flexible. The rigid gutter has its definite place bordering a rigid pavement surface, of which it is usually an integral part. With adequate curb height or toe wall, normal running water will not overflow and scour the shoulder or undercut side slopes.

There are innumerable places where it is not advisable to use the rigid-type gutter, especially where surface water is not led directly into the paved waterway but is carried to it over earth surfaces which are susceptible to erosion. One break in the surface along the edge of a rigid gutter will eventually undermine the gutter and result in costly repairs.

The many miles of ditches which have been constructed on the highways of this country far outnumber the gutters. It would be practically impossible to transform all ditches to gutters, and in many cases this is neither economically sound nor necessary. Where occasional erosion is taking place in earth roadside ditches, simple ditch checks built of logs, brush, or other similar material may correct the conditions and stop the erosion. This, of course, is the simplest method. One of the more permanent and best-looking treatments can be obtained by sodding, a method admirably adapted for light grades where the volume and velocity of the water are low. Sod ditches, however, should be swaled and of sufficient width to take care of more than normal flow.

Virginia adopts this method at the head of drainage ways, carrying it to a maximum of 3 per cent grades. Where drop inlets are not available and the volume of water to be carried becomes excessive, the sod ditch is then changed to a rough stone or cement block which is grouted in place or bonded with bituminous material. Recently, a soil-cement process has been used which may also be surface-treated with bituminous material. These types are usually adequate to carry water to an outlet, especially where their capacity is increased. The latter types are also employed on grades in excess of 3 per cent. An attempt is always made to have a sodded border 2 to 5 feet in width along both sides of this type of gutter as a protective measure, to prevent undercutting. It is readily seen that repairs to flexible-type gutters of this kind can easily be made by patrolmen and are, therefore, much less expensive than repairs to the rigid types.



Rigid ditch linings are subject to undercutting by flows of water greater than they are designed to handle.

Soil-Cement Gutters

Recent inspections have given us a

(*Continued on next page*)

They Guard and Guide where Dangers hide!



EMBURY
AIR PILOT
LANTERN
EMBURY MFG. CO., WARSAW, N. Y.

Mississippi Wagons Give Profit Insurance . . .



. . . Where Maximum Flotation and Traction Are Mandatory for Hauling Full Payloads

Contractors are assured "profit insurance" against tough hauling jobs in sand, mud, and loose dirt when they invest in MISSISSIPPI WAGONS, and here is why:

The MISSISSIPPI WAGON with unusually good flotation provided by the four-wheel trailer and tractor, together with the low-pressure drive tires, must only carry 30 pounds weight a square inch of ground contact area, as compared with 54 pounds weight a square inch with semitrailers hauling the same load.

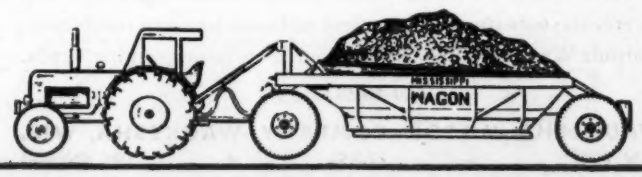
This means profitable hauls over haul roads where semitrailers and other equipment either "bog down" with a full payload, or operate with part-loads at a loss.

The low pressure tires used on the rear of the tractor require a maximum of only 12 pounds air pressure and provide approximately 350% more ground contact area than high-pressure load carrying tires used on semi-trailer units.

Yes, Mr. Contractor, when you own MISSISSIPPI WAGONS you can bid the tough hauling jobs and know if any rubber tired hauling unit can do the job it will be your MISSISSIPPI WAGONS.

AND, IF IT IS A LONG HAUL OVER DEEP SAND YOUR ONLY COMPETITION WILL BE SOME OTHER OWNER OF MISSISSIPPI WAGONS.

"THE WORLD'S MOST MODERN HAULING UNIT"



MRS MANUFACTURING CO.
JACKSON, MISSISSIPPI

Ditch Linings

(*Continued from preceding page*)

chance to observe a soil-cement ditch lining which, for ease of construction, economy, and effectiveness, has considerable merit. The linings were several years old and, even on moderate grades, where small gravel was moved during heavy rains, the cutting or erosive action has been very slight. These particular ditch linings were very much in the nature of an experiment so that all work was empirical.

Laboratory tests were not made of the available soil, but sample boxes were made up of 10, 11, and 12 per cent cement, thoroughly mixed by hand, with sufficient water added to obtain approximate optimum moisture. The sample which set up the best was selected for that project. This was installed only at the worst section of the grade and generally for a few hundred feet, although one extended a full ½ mile. The cost ran from 30 to 40 cents per running foot 4 to 6 inches thick and 3 to 5 feet wide, or 45 cents per square yard laid an average width of 4 feet.

The operation was very simple. The necessary quantities of cement were placed at definite intervals along the ditch. A Rototiller was used to loosen the soil thoroughly to the desired depth. The cement was then spread and the Rototiller again used to incorporate it thoroughly with the soil. After hand-raking it to shape, it was rolled by a specially designed simple roller consisting of five or six pneumatic-tired wheels on a straight axle. The wheels were of varying sizes, with the larger diameters in the center running out to the smallest at each end of the axle, to conform to the desired cross section of the gutter. A box was installed which could be loaded to any desired weight. This type of roller is best adapted to median-strip ditches or to side ditches with a minimum slope of 2 on 1. For slopes steeper than 2 on 1, hand rolling or compaction by a small roller across the gutter rather than longitudinally proved more efficient. In some cases, these soil-cement gutters have been surface-treated. There is one note of warning, however, that surface treating should be done only after the soil-cement has thoroughly dried; otherwise the bituminous surface will peel. It was also found that the bituminous material will hold much better where the soil-cement surface is rough.

Field-Stone Gutter

In the mountainous areas of Virginia, native field stone of varying sizes up to 8 or 10 x approximately 12 inches has

(*Continued on next page*)

WAUKESHA-POWERED

AIR TOOLS for MOBILITY and VERSATILITY on all fronts...





Air tool used by Royal Canadian Engineers — a Waukesha Engine powered Canadian Ingersoll-Rand Portable Air Compressor, complete with auxiliary equipment including a chain saw for felling trees, power hand saw for heavy timber construction, air operated auger, grinding stand and sump pump.

●

Making repairs at battle front — Royal Canadian Engineers using an air hoist, mounted on a tree trunk, to pull a drag scraper. *Overseas Photo Courtesy of Dept. of National Defense (Canada)*

Compressed air is "ammunition" for the front-line Royal Canadian Engineers who repair damaged bridges and construct new ones, build roads, landing fields and advanced bases. *Waukesha-powered* Canadian Ingersoll-Rand Portable Air Compressors give their pneumatic tools the mobility and versatility so vital to battle-winning efficiency.

The Waukesha Engine and the compressor are joined in a single unified assembly—for complete reliability. All the advantages of multi-cylinder power—quicker acceleration, clean combustion, cool valves and fuel economy with more power—are built into this compact, sturdy, 4-cylinder Waukesha Engine.

Until victory, every Waukesha is a war-work engine. Then there'll be Waukesha Engines . . . gas, gasoline, or diesel fuel . . . . for shovels, cranes, hoists, pavers, mixers, graders, surfacers, tractors or any peacetime industrial power machinery. Consult Waukesha now about your own future engine needs.

Get Bulletin 1377

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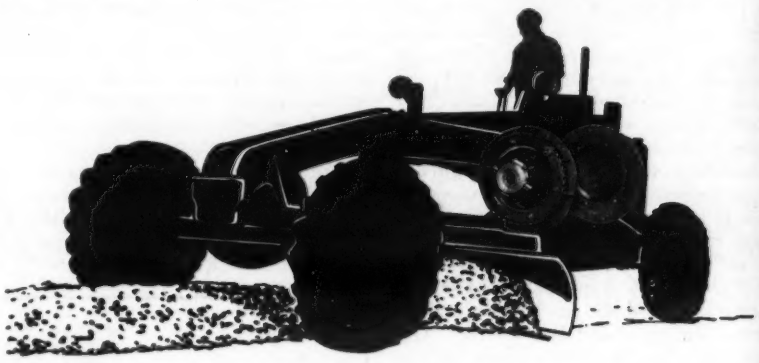
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CLUTCH *Knowhow*

That Will Simplify Your Redesigning



If the products you are redesigning for the post-war market will benefit from better conforming CLUTCHES, our engineers can give you timely help. You can utilize their extensive, war-tested clutch designing, building and applying *knowhow* to simplify your redesigning and to strengthen the competitive position of your new products.

SEND FOR THIS HANDY BULLETIN ON POWER TRANSMISSION

It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning post-war products.

ROCKFORD CLUTCH [FORMERLY KNOWN AS DRILLING MACHINE] DIVISION BORG-WARNER CORPORATION

314 Catherine Street, Rockford, Illinois, U.S.A.

ROCKFORD CLUTCHES

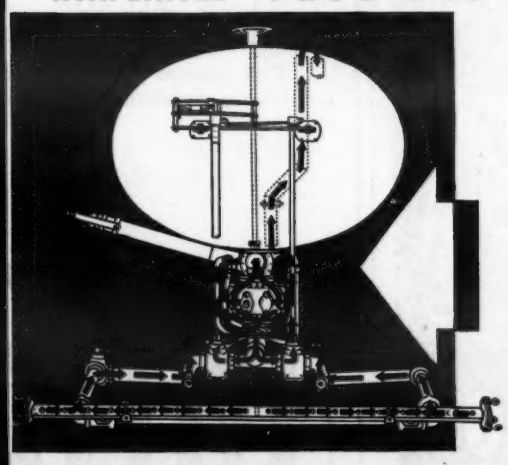
SPRING LOADED · OVER CENTER · ONE-WAY · SPRING LOADED · L-O-E · POWER TAKE-OFF · FULL-MOBIL MULTIPLE-DISC · OVER CENTER

ETNYRE

"Black-Topper"

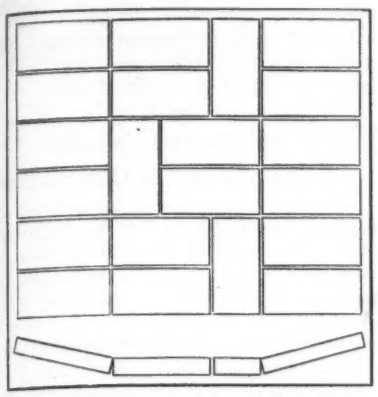
BITUMINOUS DISTRIBUTORS

EXCLUSIVE WITH ETNYRE "Vacu-Flo" CLEANING SYSTEM



Just three quarts of flushing oil needed to clean pump, spray bar, valves, strainer and lines! After spraying, all material returns to tank, is not left to clog lines and spray bar. No waste; no need to clean between loads—just at night after last load!

E. D. ETNYRE & CO., Oregon, Illinois



Plan and cross section of a semi-flexible gutter of 8 x 16-inch concrete blocks for a bottom width of 24 inches. The side sections are always the same except for the slope.

Ditch Linings

(*Continued from preceding page*)

been used to excellent advantage for stabilizing ditches. Some of this is bonded with cement mortar, especially on the steepest grades. These were laid on a prepared subgrade, usually of small broken stone. Where subgrade water was an item, the foundation was cut deeper and then filled with small stone to act as a French drain. In some cases the French drain was supplemented with agricultural tile near the outlet. This type of gutter, when bonded with cement mortar, has the same disadvantages as rigid monolithic concrete, due to the possibility of severe damage from undercutting by surface water, as illustrated. However, the component parts of the lining are more susceptible to salvage than in solid concrete structures.

Where native stone is not readily available, Virginia has developed a flexible-type gutter lining of concrete blocks 3 inches thick and 8 x 16 inches in area, laid on a 2-inch sand bed where the subgrade is pervious, and 4 inches thick on a clayey subgrade. These are laid in various patterns, with broken joints, and the gutters vary from 24 to 72 inches in width with variable backslopes to conform to the desired slope in a median strip or adjoining side slope. The value of this type lies in the opportunity to widen and deepen the gutter progressively as the volume of water increases, and at the same time maintain the same general appearance.

The pattern in which the blocks are laid provides minimum opportunity for scour and undercutting but, should this occur due to surface water running down the slope and under the side walls, the blocks will drop into the eroded area and tend to check further erosion. This is the same principle used in the heavy concrete-mat revetments laid by the U. S. Engineers to protect the underwater toes of levees along the Mississippi. The flexibility is not only a protection but the blocks can easily be set back to grade by the patrolmen by merely lifting out a block and carefully spading in the proper amount of small stone to raise it.

In cases where really severe damage to the block-lined gutter is caused by water far in excess of any anticipated volume, individual blocks may give way and become undermined. If the undercutting occurs for any material distance, a subgrade of stone to effect a French drain can easily be installed by the patrolman. Otherwise, he can repair the damage very readily and replace the blocks. This method has been in use in Virginia since 1940 when the first installation was made in the Staunton District by WPA labor.

These blocks are being manufactured in other districts by patrolmen on rainy days and also by prison labor. The average cost is about 12 cents per block when manufactured this way and when purchased commercially has been from 14 to 15 cents.

Semi-Flexible Gutter

In some cases, due to soil or other conditions, it has been found more advisable to bond these blocks. Instead of using cement mortar which would make of them rigid-line gutters, bituminous material is used to fill the interstices, thereby making them what might be termed semi-rigid or semi-flexible surfaces.



The semi-flexible type of roadside ditch lining used by Virginia is made of concrete blocks, 3 x 8 x 16 inches, laid in various patterns, depending on the width of the ditch bottom, which in this case is 32 inches.

This method of semi-flexible paving was developed by Harold J. Neale, Landscape Engineer, Virginia Department of Highways.

Concrete-Block Specifications

The Virginia Department of Highways has drawn up specifications for the

(*Concluded on next page, col. 3*)



Complete line of
gasoline, pneumatic and electric driven
concrete vibrators and grinders
Write for information and prices
ROETH VIBRATOR COMPANY
1717 Farragut Ave. Chicago, Ill.

For Complete Facts



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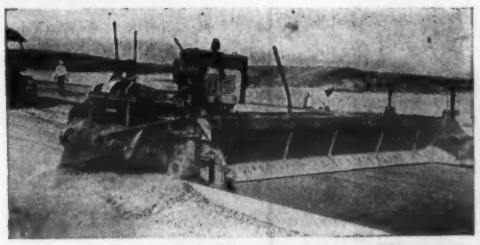
The many unique features embodied in the new Standard-Lewis Subgrader come as a result of design by practical paving equipment engineers. These men know well the problems encountered and have built into this machine many practical improvements that save contractors, time, labor and money.

The new Standard Steel 8-page folder covers in detail all information relating to the efficient operation and economy provided by this ingenious Subgrader.

A request on your letterhead will bring a copy promptly.



This is an example of deep cutting into tough material—gravel as large as 14" in diameter is handled with ease.



No chipped or broken edges of concrete pavement is experienced with the solid rubber tired wheels you can use on the STANDARD-LEWIS Subgrader.

OTHER STANDARD PRODUCTS

ASPHALT AND CONCRETE FINISHERS
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STANDARD STEEL CORPORATION
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Los Angeles 11, California



The Quikcet bench vise has a number of features providing quick action and ease of operation.

Quick-Setting Vise For Machinist's Bench

A completely new machinist's quick-action bench vise which is manually operated but eliminates running the screw in or out to close or open the vise has been announced by Grand Specialties Co., 3135 West Grand Ave., Chicago 22, Ill. This Quikcet vise is opened or closed simply by pushing on the body of the free jaw which slides in swiftly on a ratchet screw and two precision guide rods and tightens with a turn of the handle.

The vise is equipped with a trigger release pawl with ¾ inch of thread which holds the hardened screw under spring tension. The vise opens instantly to the full 3 inches by pressure of the thumb or finger on the trigger release after the tension has been eased by a single turn of the loose-proof handle. It is then ready, without further adjustment, for instant closing on any other work.

Additional features claimed for this vise are that it is made of alloy steel of even greater than forged capacity with reinforced extra-thick-wall body construction and extra-heavy precision guide rods, and that it has a balanced precision grip at all points, with polished, serrated and hardened jaws which are integral with the body, eliminating jaw plates which may come loose or have to be replaced. It is spatter-proofed for welding use with copper plating on all working parts and handles, and rust-proofed with gray wrinkle enamel finish. It is equipped with a polished anvil on top and with a bottom screw clamp for quick shifting to any bench or job, as well as with the usual slots for bolting to a bench for stationary use.

Complete information, including prices, may be secured direct from the manufacturer by mentioning this illustrated text.

Branch Pipe Outlets And How to Make Them

A handy pocket-size manual for men responsible for piping has been issued by Bonney Forge & Tool Works, Dept. 214, Allentown, Pa. This 32-page "Handbook of Branch Pipe Outlets" illustrates and explains the four simple steps in installing full-pipe-strength outlets by the WeldOlet method. It also illustrates the tools needed to make the joint, the three types of WeldOlet fittings available for butt-welded, threaded, and socket-welded branch pipes, and typical installations.

Copies may be secured by writing to the manufacturer and mentioning this review.

Ditch Linings

(*Continued from preceding page*)

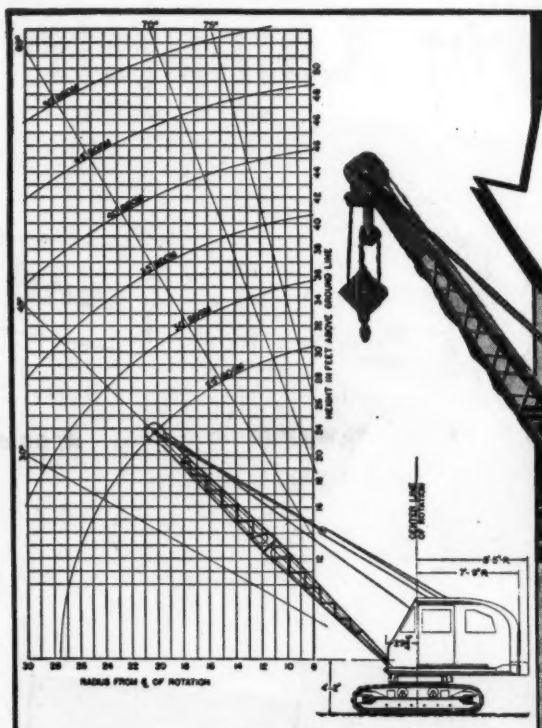
contract production and placing of plain-cement concrete-block gutters and the method of filling the joints. These specifications call for the concrete blocks to be 3 x 8 x 16 inches, with a ½-inch tolerance allowed on the 8 x 16 dimension, and the minimum weight to be 126 pounds per cubic foot. The blocks are to be laid on a foundation course of sand or stone screening approximately 2 inches in depth, with two sides of each at right angles to the center line of the gutter, and no interstices are to exceed an inch in width. All joints have to be satisfactorily broken.

The specifications call for filling the joints between the paving blocks with hot tar or asphalt after the joints have been carefully cleaned out. Particular care is required to prevent the bituminous material from spreading over the surface of the blocks for a width of more than an inch on either side of the joints. The bids for these block gutters are taken on a unit price per square yard complete in place, which includes all materials, equipment, grading, tools, labor and work incidental thereto.

Rockford Clutch Opens Engineering Laboratories

A plant which started almost half a century ago in an 80 x 100-foot building and has grown into 625,000 square feet of manufacturing space recently opened its new engineering laboratories. The concern is the Rockford Clutch (formerly the Rockford Drilling Machine) Division of Borg-Warner, at Rockford, Ill., which is operating the testing and research facilities originally established by the parent organization.

Arch A. Warner, President, announced that as soon as possible additional machinery and testing equipment for clutches in eight distinct fields will be installed, and clutches for every purpose will be designed, developed, and tested in the laboratory as well as in the field.



Boom Length	Radius in Feet	Standard C'Weight	1000 lb. Extra C'Weight	2000 lb. Extra C'Weight	1400 lb. Rear C'Weight	Rear C'wt. +1000 lb. C'Weight	Rear C'wt. +2000 lb. C'Weight
25 ft. Boom	10	12,550	14,000	15,500	14,700	16,200	18,000
	12	9,580	10,750	11,900	11,290	14,740	13,300
	14	7,780	8,680	9,600	9,120	10,020	11,400
	16	6,530	7,280	8,000	7,660	8,420	9,200
	18	5,620	6,270	6,900	6,610	7,260	7,900
	20	4,950	5,550	6,100	5,810	6,380	6,900
	22	4,420	4,920	5,400	5,180	5,690	6,200
	25	3,780	4,230	4,700	4,460	4,900	5,300

AN EASIER HANDLING EASIER OPERATING CRAWLER- SPEEDS EVERY JOB!



Model TLDT-20 Truck-type Crane, 12-ton capacity



Model T-6-K Truck-type ½-yard Shovel, 6 to 8 ton Crane. Completely convertible.

MODEL C-16 MICHIGAN ½-YARD CRAWLER-CRANE

Faster production, greater operating ease, lower costs on all types of crane work—that's what owners and operators get with this combination of job-proven MICHIGAN-built crawler unit plus the air-controlled mechanism of the world-famous Michigan Truck-Type Shovel-Crane . . .

The complete story about Model C-16's *tractor steering, simultaneous travel-hoist-swing-crowd, quick convertibility, fingertip air-controlled clutches*—and many other time-saving, profit-earning MICHIGAN features—is given in Bulletin CE-75. Write today.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

CUMMER
ASPHALT PLANTS
EIGHT SIZES
Up to 1000 Tons per day
DRYERS
Two-Fire and Internal Fire
30 to 100 Tons per hour
Electric Batch Timers
50 Years' Experience
THE F. D. CUMMER & SON CO.
EAST 17th & EUCLID
CLEVELAND 15, OHIO

Robert B. Brooks, Consulting Engineer

(*Continued from page 8*)

not the slightest attention was paid to property rights of individuals. The Government took over all tourist hotels, filling stations, and other similar businesses along the highways. No attention was paid to location of approaches to towns and cities as desired by the people. Bürgermeisters and others who questioned, and any others not in agreement, were removed.

"The individual governors, Democrats and Republicans, acting for the nine states of the Missouri River Valley Basin have petitioned the President and Congress to authorize and direct the U. S. Army Engineers and the U. S. Bureau of Reclamation to solve the Missouri River Valley problem, instead of having a totalitarian authority, responsible to no one but the President, superimposed over this section of the country."

Brooks is ever ready to debate the stand he takes on the MVA and is such a formidable antagonist that one St. Louis newspaper, in favor of the MVA, has singled the consultant out as a target for special attack, which bothers Brooks not at all. He is too busy with his civic affairs to worry over newspaper opposition. For the past eighteen years he has been a member of the Board of Directors of St. Louis' famed Municipal Opera, which for twelve weeks every summer presents light operas and operettas in a beautiful al fresco theater in the heart of Forest Park.

"We can seat 10,000 at these popular musical attractions," said Brooks enthusiastically, "and average about 7,500. Although the admission is scaled low, from 25 cents up to $2.00, we also have 1,700 free seats, and for service men and women we reserve 1,000 choice seats every night."

Chief among his interests are the postwar plans for St. Louis, especially the proposed development of the waterfront area where forty city blocks of old buildings have been razed to provide an 82-acre site for a park fronting the Mississippi. New arterial highways will enter St. Louis from the north, south, and west and converge in the downtown area on elevated structures, eliminating all grade crossings. The Terminal Railroad is due to go underground in this plan.

Writer and Scholar

What part he will play in this development is of no importance to Brooks. He is proud of the fact that St. Louis is ready to finance its share of these postwar plans with $63,000,000 available, one of the nation's few big cities that have money as well as plans in readiness. In the meantime, while his clients keep him busy, he manages to find time to keep abreast of the latest engineering thought and developments.

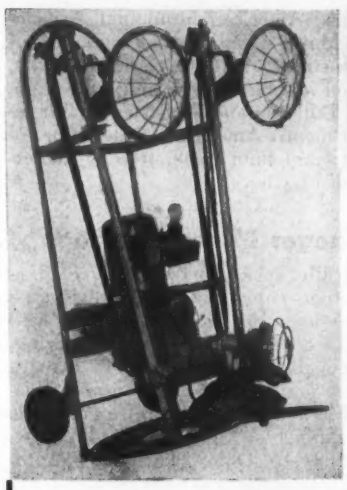
"We have to look backward sometimes as well as forward," said Brooks with a smile as he flipped the pages of a book on his desk. "Here is a book written by Vitruvius, chief engineer for Julius Caesar. He tells about a system for amplification of sound that the Greeks used in their theaters. And we can still learn from the Romans about hydraulics and water works. I always had considered it a needless sacrifice for some early soothsayer to kill an animal to get his entrails. Now I read how in that manner the Roman engineers determined the health of the animals, and whether it was wise to found a colony in that region."

During some of his research Brooks uncovered previously unpublished letters of Robert E. Lee, who was a famous civil engineer as well as a Confederate general, and wrote a paper on Lee's work of rescuing St. Louis from impending isolation as a river port, when the Mississippi threatened to move eastward.

Well stocked bookcases occupy nearly one wall of Brooks' office, and flowers are much in evidence around the room. His professional engineer's license hangs on the wall and a tiny American flag stands on his desk. He has been on the Board of Directors of the American Road Builders' Association for twenty years, and was also a member of the Missouri State Highway Commission. The telephone over which Robert B. Brooks carries on a great deal of his business had quieted down for a few minutes, but now in the late afternoon it rang again for attention. His enthusiastic reply cut in:

"Handball? Sure, I'd enjoy a game now. I'll be right over." Bob Brooks was as happy as a school boy as he pulled a battered handball glove from the desk drawer and started for the door. The day's work was over; playtime had begun.

Help speed the day of final victory!
Buy War Bonds regularly.



PORTABLE LIGHTING PLANT

COMPLETE • NO EXTRAS TO BUY

Can be taken anywhere and put in operation immediately. Ideal for construction jobs • maintenance work • unloading trucks and cars. The 600-watt, 110-volt, DC generator and air-cooled gasoline engine are mounted on a steel hand truck. Unit includes 2 large, adjustable standard, 200-watt flood lamps: a 150-watt spot light: 20-foot extension cords on all lights. Weighs only 190 lbs. and operates 4 hours on 2 quarts of gasoline. Can be used to power portable tools such as drills, saws, etc.

WRITE DEPT. "A"

CLARK MANUFACTURING COMPANY
233-245 E. Keefe Ave. Milwaukee 12, Wisconsin

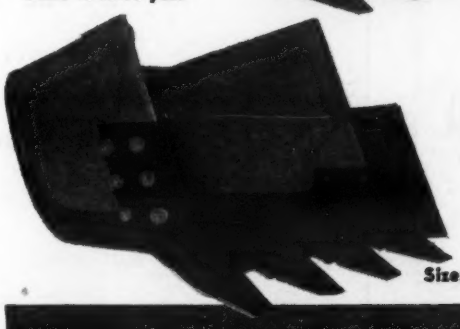
America's most complete line of material handling buckets.



Clamshell
Sizes ½ to 2 yds.



Shovel
Sizes ½ to 18 yds.



Pullshovel
Sizes ½ and ¾ yd.

WE BUILD ALL 4 MATERIAL HANDLING BUCKETS

PMCO ALL PURPOSE
• SHOVEL
• PULLSHOVEL
• DRAGLINE
• CLAMSHELL

We build a wider and more complete line of material handling buckets than any other manufacturer. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

FRONTS, BOTTOMS, SCOOPS, and teeth, shown in red on buckets, are 14% manganese steel developing up to 120,000 tensile p.s.i. for long service life and hard abuse.

Experience Counts

See your shovel engineer or equipment dealer about PMCO Dippers and Buckets.

On the ½ yd. and ¾ yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable . . . a great advantage to operators.



Dragline
Sizes ½, ¾, 1, 1½, 2, 2½ yds.

Quality Since 1880

PETTIBONE MULLIKEN CORP. CHICAGO 51, U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.

New Advisory Group Established for FWA

A new Public Works Construction Advisory Committee has been appointed for the Federal Works Agency, composed of representatives of twelve national organizations engaged in or responsible for the planning, design, construction, or operation of public works. This Committee, of which Baird Snyder, Assistant Administrator, Federal Works Agency, will be liaison officer between the Committee and General Philip B. Fleming, Federal Works Administrator, consists of:

Frederic Bass, American Public Works Association; E. Lawrence Chandler, American Society of Civil Engineers; F. Stuart Fitzpatrick, United States Chamber of Commerce; J. W. Follin, Producers' Council, Inc.; H. E. Foreman, Associated General Contractors of America, Inc.; Hal H. Hale, American Association of State Highway Officials; S. Logan Kerr, American Society of Mechanical Engineers; Earl Mallery, American Municipal Association; Major Edmund R. Purves, American Institute of Architects; Frank Bain, Council of State Governments; R. J. Gray, Building and Construction Trades Department, American Federation of Labor; and Paul Betters, U. S. Conference of Mayors.

Jaeger Mixer Catalogs

A trailer-type concrete mixer of 3½-cubic-foot capacity and featuring an automatic loader which permits a continuous cycle of mixing, discharging, and reloading, resulting in 15 to 20 extra batches per day, is described and illustrated in a 4-page folder released by the Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio. This 3½-S Auto-Loader incorporates the same load-speeding method and other exclusive features of the larger Jaeger Skip-Shaker power loaders and Shaker hoppers with which the big 28-S and 56-S plant mixers are equipped.

The Jaeger Big Boy 3½-cubic-foot Tilt-Trailer, described and illustrated in a 2-page Bulletin TS-45, is designed with the patented Jaeger drum with the built-in V-bottom, and is of welded steel construction which, according to the manufacturer, means a saving of 145 pounds in handling on the job.

Both the Auto-Loader and the Big Boy are powered by an enclosed 3-hp air-cooled Wisconsin engine, and are available with pneumatic tires or with steel disk wheels equipped with Timken bearings.

Copies of these catalogs are available to readers of CONTRACTORS AND ENGINEERS MONTHLY upon application direct to the company and mention of this publication.

What are you paying for "SEAT-FAG"



If your power shovels, graders, bulldozers, clamshells, cranes, etc., are equipped with hard iron seats you are unquestionably paying a good price for "Seat Fag", in terms of work-loss and reduced efficiency.

Milsco Cushion Seats are a dividend-paying investment . . . through the conservation of energy and human efficiency for *useful work*. These seats are supplied complete, with the heavily padded, comfortable cushion. Seats may be fitted with a variety of attachments for practically any standard type of mounting.

Write for your copy of FILE FOLDER 44-A, which contains detailed information.

MILSCO MANUFACTURING CO.
2758-F N. 33rd Street, Milwaukee 10, Wisconsin



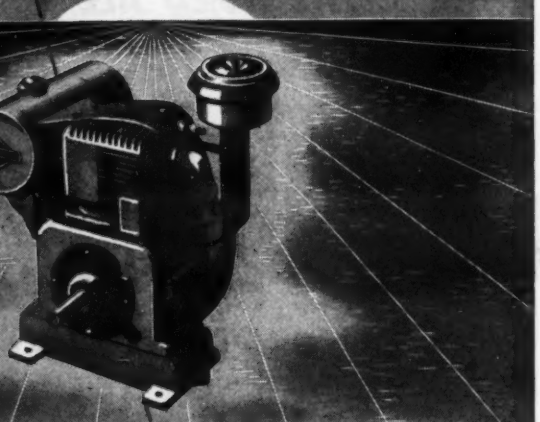
No. 123
Crusader with back rest and removable cushion.



No. 813
Bucket Type Cushion Seat with Back Rest.

Milsco MILWAUKEE Cushion Seats FOR FARM AND INDUSTRIAL EQUIPMENT

NEW FRONTIERS



for BRIGGS & STRATTON ENGINES

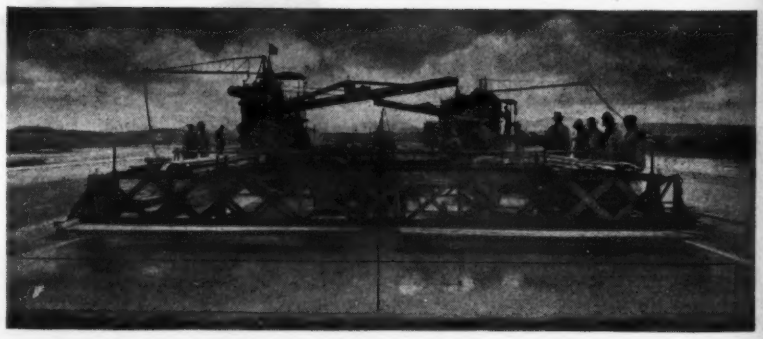
During more than a quarter-century of *continuous* production of "*air-cooled power.*" Briggs & Stratton has been constantly recognized as the leaders in this field—and has earned foremost recognition for pioneering in improved design—for engineering advancements—and for constantly improved precision manufacture.

Their unequalled performance has again been proven by the brilliant record of Briggs & Stratton 4-cycle *air-cooled* gasoline engines in hundreds of standard and special wartime uses and applications. Their dependable service under severest conditions assure still greater service in the period ahead—through use on an ever increasing number of gasoline-powered appliances and equipment.

Air-Cooled Power 4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES

Only in Briggs & Stratton 4-cycle air-cooled gasoline engines can you get the extra performance, the durability, and economy made possible *through 25 years of consistent leadership.* Let us help you plan in fitting this dependable power into your designing and production of gasoline powered equipment, tools, and appliances.
BRIGGS & STRATTON CORP., Milwaukee 1, Wis., U. S. A.

"S-O-M-E-T-H-I-N-G G-O-O-D"



Numerous new types of contraction joints and methods of installing them have been tried and discarded.

The value of the ⅛" 'FLEX-PLANE' ribbon type joint and 'FLEX-PLANE' machine for installation has been proven.

The State . . .

secures better roads.

The Contractor . . .

secures value in speed—

uniformity—less supervision.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO

Building the Phoenix Invasion Breakwaters

Construction Men Created Out of Soldiers; Yankee Teamwork Wins in Building Forms, Reinforcing, Pouring

MAJOR Roy Johnson of Clifton, Va., doesn't know where the 372nd Engineer General Service Regiment is now. He left them at Nancy, France, and the fortunes of war may never bring them together again. But as its old S-3, Johnson is ready to swear that wherever the 372nd ends up—India, China, the Philippines, or Japan itself—they'll never run into a construction job they can't lick.

The Major's Exhibit A piece of evidence is the job the 372nd did in building units of "Phoenix" for the artificial harbors used in the Normandy invasion. The Phoenix sections were the steel-and-concrete breakwaters, each as big as an apartment house, towed across the English Channel and sunk off the beaches to give protection for the Army's invasion unloading operations.

For two months in the late summer of 1943, construction of Phoenix units was the 372nd's mission. It was their mission because no other construction agency in the British Isles, civilian or military, was willing or able to tackle it. So Johnson won't be surprised if some day soon he hears from the boys in China or somewhere that they've completed another job the experts shook their heads over.

Acquiring the "Know How"

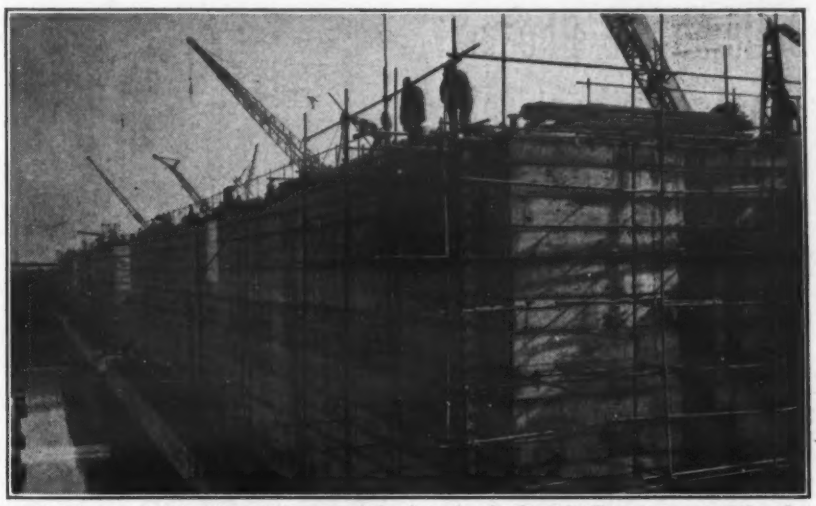
When the 372nd was handed the Phoenix assignment, only 6 per cent of the men in the regiment could be considered experienced construction men. Less than half of this 6 per cent possessed any experience in concrete construction. Only a tenth of the 6 per cent were experienced steel men. Not a single man in the regiment could be considered an experienced form carpenter. In short, in its line companies the regiment could muster only 75 men with civilian construction experience of any value to the project. It wasn't a question of starting with a set of drawings and a skilled organization; it was rather a problem of training men "on the job", with a construction target date scheduled very tight.

"The method adopted was to set up a corps of inspectors of selected men from each company," says Johnson, "and sufficient draftsmen to make pictorial or perspective drawings of each operation. The actual construction drawings were our training aids; and we set up our inspection corps to act also as inspectors in close liaison with the platoon sergeants, squad leaders, and the S-3 section. They were to be the go-betweens from the job to the draftsmen and designers, anticipating any detail or perspective drawings—any training aids, that is—which would be helpful to the untrained men actually having to do the work. We had to so simplify each operation that mistakes could be avoided or eliminated. I know that the quality of the final work did not suffer through the use of these untrained men."

Job Set-Up

In his completion report on the project, Johnson pointed out other features of the methods and techniques the regiment used.

Steel and form yards were established with their operation assigned to one of the regiment's line companies. Bending machines were set up in the center of the steel yard so that rough steel could enter at one end, and the finished product could be laid out at the other. A separate drafting sheet was prepared for each type of steel used, with a drawing of the bend, length, and location in the Phoenix unit. There were some 225 different lengths and bends used for the units; and it required careful layout and control in the steel shop and yard to avoid mixing steel and consequent loss of man-hours in re-sorting.



The Phoenix breakwater sections used for invasion harbors in Europe were steel and concrete structures each as large as an apartment house.

Much the same system was used in the form yard. Sets of jigs were made for

(*Continued on next page*)

"BICKNELL BETTER BUILT"
PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.
Write for descriptive circular
BICKNELL MANUFACTURING CO.
12 LIME STREET ROCKLAND, MAINE

Clear Land at Lower Cost
—Increase Tractor Income!

PACIFIC NORTHWEST land clearing costs have actually been cut from 50 to 75 per cent by Isaacson Klearing Blades. This may seem like an over statement, but the fact remains they are doing it for others and will do it for you.

First developed as a means of making logged-off stump land usable, these blades have since been adopted by many users for removing quickly and easily, trees, brush, stumps, roots and rock. These users particularly admire the way they comb out roots and other obstructions to a depth of 21 inches below the ground top, leaving the valuable top soil intact, ready for plowing. They like, too, the manner in which the blade piles the material, dirt free, ready for burning.

The specially designed teeth, adjustable to three positions, are shaped for maximum penetration and lifting power. The blade fits into the positions of your regular blade in a few minutes.

Available now for your Isaacson cable or hydraulic operated Trac-Dozer. See your dealer today, or write for complete details —prove to yourself you can cut YOUR clearing costs.



ISAACSON

A PRODUCT OF THE ISAACSON IRON WORKS • SEATTLE

Building the Phoenix Invasion Breakwaters

(*Continued from preceding page*)

the forms, turned out complete for all units by the carpenter shop. The form work was completed at the same time as the bottom pour, permitting most of the form company to return to the boats and eliminating a large majority of the carpenter work on the boat itself. With each Phoenix unit containing some 4,000 yards of concrete and 700 tons of steel, 424,000 square feet of forming was required. Valves, hand rails, ladders, and other marine fittings all required careful placing in the forms. Some difficulty was experienced with supplies of form hardware and special fittings, and it was necessary to place men in the factories of the suppliers to assist in their manufacture.

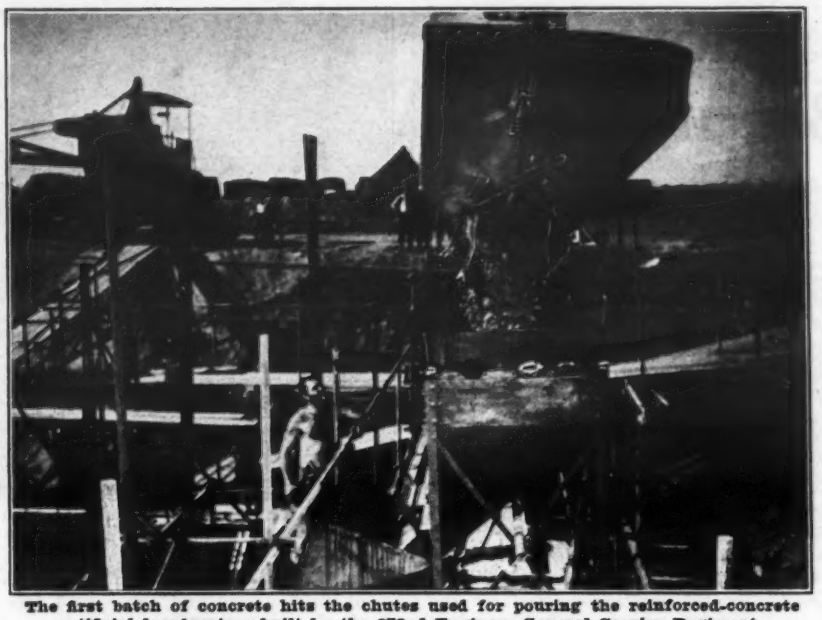
Due to the method of interlacing the reinforcing steel, it was impossible to prefabricate any large quantity of steel. Each piece was placed individually. A portion of the beam steel was fabricated and arc welded in the steel yard. However, since the steel in the cross walls interlaced with these beams, only the skeleton shape of the structure could be prefabricated.

Early in the job it became apparent that, to meet the construction schedule, it would be necessary to phase the job by companies. While it was desired to retain the integrity of units and develop each squad as a fully competent unit in itself, as part of the training for future jobs, it was found necessary to make each company responsible for one particular phase. Each Phoenix unit was divided into its logical sequence of steel work, forming, and concrete placing. Each company, therefore, developed a certain amount of specialist ability in one of the particular phases; but there was sufficient overlap to give experience in all operations.

The competitive spirit was also fostered between units, between companies, and even between squads wherever possible, so divided as to compete with one another in each phase. With this phasing, it was possible to set sufficient steel and forms during daylight hours to pour one half of a 4-foot lift each night, up to and including the half deck.

Equipment Does Its Share

Heavy equipment used on the job included five 10-ton stiffleg derricks, diesel and electric, with 90-foot booms; five 34-E pavers; one Link-Belt Speeder crane; one Bay City and a 1-yard P&H crane with clamshell buckets at the Blaw-Knox batching plant; and five steel bending machines, in addition to regular organization equipment. The General Service TE equipment proved again to be an excellent basis, the most valuable pieces probably being the truck-mounted air compressor and the dozer. While sufficient operators were found for each piece of equipment for each shift on the 24-hour-a-day, seven-day-a-week schedule, their experience had been general,



The first batch of concrete hits the chutes used for pouring the reinforced-concrete artificial breakwaters built by the 372nd Engineer General Service Regiment.

and it was necessary to school them in the operation of each piece. The regiment's H&S Companies were charged with the maintenance and repair of all heavy equipment, and held schools on off-duty hours for all operators.

Studies in Concrete

Due to the strong tendency on the part of the inexperienced mixer operators to add water, it became necessary to hold several classes on the fundamentals of concrete mixtures to make them appreciate the necessity of holding to a fixed water content. Concrete placing, while seeming simple enough to the untrained men, caused the greatest concern and required constant explanation and demonstration of results, to achieve sufficient puddling. The specifications for concrete required 2,700 pounds at 7 days and 4,000 pounds at 28 days on a 6-inch cube, with a 1:1½:3 mix by volume. It was further required that the slump should not exceed 4½ inches, and the weight not less than 147 pounds per cu.

(*Concluded on next page*)

LANSING

WHEELBARROWS
CONCRETE MIXERS
DRAG SCRAPERS

Lansing Company
LANSING, MICH.
SINCE 1861



MANUFACTURERS of

PREMOULDED EXPANSION JOINTS; FELT-SIDED ASPHALT JOINTS; SELF-EXPANDING CORK JOINTS; FELT SIDED AND CORK JOINTS; FIBER JOINTS...

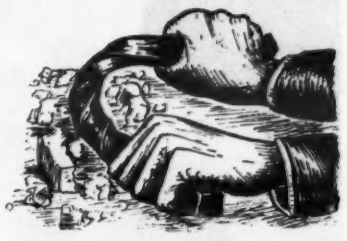
ASPHALT PLANKS for—
INDUSTRIAL FLOORING;
BRIDGES AND BY-PASSES,
RAILROAD TRACK FILLER,
ETC.; ETC.; ETC.

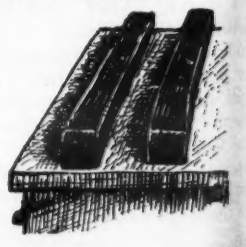
— Para-Plastic —
EXPANSION JOINT SEAL
EXTENDABLE—MAINTAINS
BOND at O° F.

HIGHWAY DRIVING IS A REAL PLEASURE ON CONCRETE ROADS

MADE SAFE and SMOOTH with Para-Plastic EXPANSION JOINTS

1. 

2. 

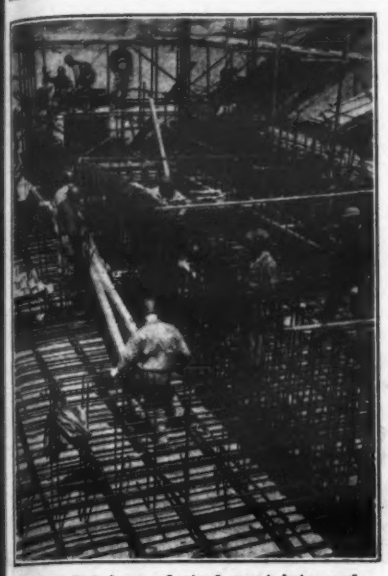
3. 

THREE TESTS: PROVING PLIABILITY OF Para-Plastic IN COLD WEATHER

1 — PARA-PLASTIC Compound Frozen in Solid ICE.
2 — Still PLIABLE, easily BENT or TWISTED.
3 — In few Minutes—RESUMES Normal SHAPE.

SERVICISED QUALITY PRODUCTS

SERVICISED PRODUCTS CORP.
6051 West 65th Street, Chicago, Ill.



About 700 tons of steel went into each Phoenix unit.

Building the Phoenix Invasion Breakwaters

(Continued from preceding page)

bic foot.

Gravel and sand were delivered from six different pits in such a manner that it was not possible to do any mixing, and consequently impossible to hold a uniform gradation. Of some 25 samples, the average weight of the gravel was 95 pounds per cubic foot and sand 107 pounds.

Trial mixes of 1:1½:3 showed the batch to be slightly over-sanded; however, a water-cement ratio of 0.70 was adopted and, to retain the desired workability, it was not materially reduced. The mix finally adopted was: 784 pounds of cement, 45 gallons of water, 2,485 pounds of gravel, and 1,360 pounds of sand. The average yield of this batch from hopper measurements was 31.4 cubic feet.

The quantities of concrete poured daily required numerous checks on the moisture content of sand and gravel as the shovel dug deeper in the pile. The slump cone was used only as a check at the mixer, and any material change called for a check of batcher weights and moisture content. Due to variation in gradation, the slump ran from 4½ to 5½ inches, and in some locations, with closely woven steel, the slump was increased to 6½ inches.

The Major Says

"While the intricate steel layout and form work might generally be considered complicated and difficult," Major Johnson concludes, "it demonstrates clearly that it would be hard to find a project beyond the scope of an Army Engineer General Service Regiment. Full use must be made of all men experienced in construction, even though they may not be competent squad leaders or foremen. The integrity of tactical units must be maintained, and the work phased in a logical sequence with fixed responsibility for each portion of the project, but with a carefully balanced overlap to gain experience and an appreciation of the problems of the unit to follow. More than anything else, however, a program must be designed to bring the project down to earth for each private, to so simplify it pictorially, by lectures, and by personal orientation that every man knows how, why, where, and when!"

En Route to Victory

Built in graving and dry docks in the Thames estuary, the Phoenix units were later floated out to anchorages near the Channel ports to wait their turn in the vast assemblage of units of all kinds which were to make the 1944 cross-channel invasion a success. The 372nd doesn't know in which of the artificial harbors the units it built finally carried out their designed mission. But when the 372nd wound up in the line stopping the Germans' last attempt at an offensive drive in the Ardennes "Bulge" battle, the Engineers knew that the invasion they helped "build" was ending up in the most complete military victory the world has ever seen.

Japan is next!



Construction of invasion harbors proceeded at top speed prior to D-Day in Normandy. Here night workers pour the top deck of one of the breakwater sections.

For 68 Years Builders of Fine WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio
Watch for Post-War Models



Raybestos leads with the most complete line of friction materials for road builders, shipyards, contractors, and in farming, mining, lumbering and coal stripping operations.

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc., BRIDGEPORT, CONN.

Raybestos
INDUSTRIAL FRICTION MATERIALS

BUY AN EXTRA BOND

MANUFACTURER of FULL METALLIC, SEMI-METALLIC, WOVEN and MOLDED FRICTION MATERIALS.

George Seabury Dies; Succeeded by Carey

George T. Seabury, for twenty years Secretary of the American Society of Civil Engineers, died on May 25 at the age of 65. Mr. Seabury had planned to retire on June 1 and his successor, previously selected, is Col. William N. Carey, formerly Chief Engineer of the Federal Works Agency.

A graduate of Massachusetts Institute of Technology, Mr. Seabury had had a wide experience in both engineering and construction, having worked with firms engaged in the construction of the Grand Central Terminal in New York City, subways, and an upper portion of Riverside Drive. From 1909 to 1915 he served as an engineer for the New York Board of Water Supply and from 1915 to 1918 was a division engineer for the Providence Board of Water Supply. Mr. Seabury served as a major in the Army during World War I and subsequently formed his own construction firm. In 1925 he became Secretary of the American Society of Civil Engineers.

Col. Carey, his successor, was at one time City Engineer of St. Paul, Minn., and for the past four and a half years has been on active duty in the Corps of Engineers, U. S. Army. He was released from military service on June 1, when he assumed his new position as ASCE Secretary.

Pipe-Line Construction

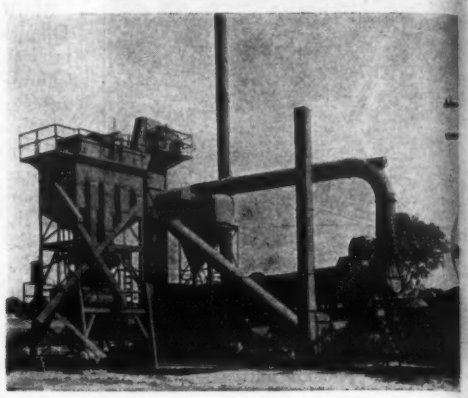
The dramatic story of pipe-line construction, from the first clearing of right-of-way to the final backfilling of the trenches, is told in an 8-page booklet "Pipelining with Caterpillar" just released. It contains a series of vivid on-the-job photographs, accompanied by descriptive text, showing the performance of Caterpillar equipment doing a tough job on schedule.

Copies are available to all who write to the Caterpillar Tractor Co., Peoria, Ill., requesting Form 8902 and mentioning this item.

New Davey Dealers

The Acme Contractors Machinery & Equipment Co., 4221 W. Harrison St., Chicago, Ill., has been appointed by the Davey Compressor Co., Kent, Ohio, manufacturer of a line of stationary and portable compressors, heavy-duty truck power take-offs, and pneumatic saws, to provide additional sales and service facilities in the Chicago area. The Gunson Iron & Steel Co., which maintains its main office at 512 Lyceum Bldg., Duluth 2, Minn., has been named to handle the complete Davey line in the area surrounding Duluth.

INCREASED EFFICIENCY and PRODUCTION in Asphalt Mixing—

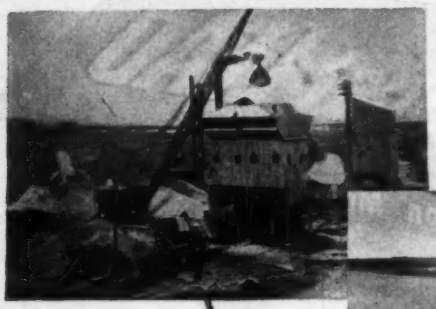


★ Compactness and a substantial increase in dryer capacity and efficiency are among the results accomplished by refinements in design in this recently completed H & B Portable (PA-30) Asphalt Plant. A larger fan is used, and the duct system from the dryer to the dust collector and from dust collector to the exhauster has been redesigned. The new horizontal cyclone dust collector is more compact and efficient. The exhaust fan, motor which drives the dryer, and the speed reducer are combined in one completely assembled unit which is mounted on a separate platform. This decreases length of the dryer unit and greatly facilitates handling. A new type of screen reduces the overall height of the plant considerably, without reducing the bin capacity.

Further information concerning this plant will be furnished on request.

HETHERINGTON & BERNER INC.
731 Kentucky Avenue • Indianapolis 7, Indiana

Hetherington & Berner



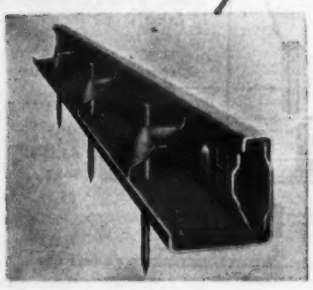
USE THE COUPON TO OBTAIN THESE HELTZEL BULLETINS

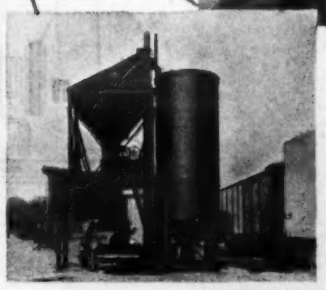
T-29-CB (General Duty Concrete Buckets)
B-31 (Truck Mixer Charging Plants)
C-34 (Portable Batching Bins)
B-19 (Steel Forms)



call Heltzel







● Prepare for the "go-ahead" signal on concrete construction by writing or calling Heltzel now. Ask for these engineering-styled, easy-to-read, easy-to-use, Heltzel bulletins:

T-29-CB (General Duty Concrete Buckets)
B-31 (Truck Mixer Charging Plants)
C-34 (Portable Batching Bins)
B-19 (Steel Forms)

Name_____
Address_____
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(Type of construction usually engaged in)

Heltzel BUILDS IT BETTER
BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary
CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
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CURB FORMS
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★ 20% to 40% lighter than other buckets, type for type.
★ All welded construction for greater strength and durability.
★ Manganese Steel chains, fittings, and reversible tooth points.
★ Full Pay Load every trip, even in wet digging.
★ Three Types: light, medium, and heavy duty. With perforations or solid.

HENDRIX Lightweight DRAGLINE BUCKETS
3/8 to 30 Cubic Yards
DESOTO FOUNDRY INC. · MANSFIELD LOUISIANA



State-Aid Road Act To Benefit Counties

Highway Legislation Will Give to Alabama Counties $5,000,000 in First Post-War Year Without Matching, But 50-50 After That

✦ UNDER an act passed by the 1945 Legislature and recently signed by the Governor, the counties of Alabama will receive an outright gift of $5,000,000 for farm-to-market roads during the first year of the post-war highway program. The act, by amending the 1943 state farm-to-market road act, empowers the State Highway Department to set aside $2,500,000 to be held in reserve until an equal amount of Federal funds is available under the Federal Highway Act passed in 1944.

The money will be distributed equally to each of the sixty-seven counties which will not be required to match the funds for the first year. After the first year, however, they must put up an amount equal to any they receive from the State or Federal government.

The act further provides that in the second and third years of the post-war highway program, Federal funds will be allocated equally among the counties without being matched by state money. Through the State-Aid program, however, each county will have to contribute an amount equal to that received from the Federal government and the State in turn will match the county's share. Counties not participating in this program will receive no Federal money.

A third provision is that, beginning with the start of the post-war program, the State Highway Department will set aside monthly for each county one sixty-seventh of one cent of the state gasoline tax. At the close of each fiscal year, any amount not matched by the county will be impounded by the Highway Department and held for the local government to match the following year. Unused funds at the end of the second fiscal period will revert to the State Highway Department.

A breakdown of this allocation shows that each county during the first year will receive approximately $37,500 from the State and an equal amount from the Federal government even though it makes no contribution of its own. In the second and third years, it will receive the same sum, but will be required to put up $37,500 out of its own treasury.

Shop Equipment Firm Prepares for Export

Owatonna Tool Co., Owatonna, Minn., manufacturer of gear and bearing pulling equipment for use in automotive service shops, as well as maintenance hand tools, has joined the group of organizations whose products are to be marketed abroad by Borg-Warner International. A changed system of distribution in South America, Trinidad, and Puerto Rico, was recently announced by Borg-Warner International, by providing for offices and headquarters at Sao Paulo, Brazil, and a warehouse in Auburn, Ind., where export shipments will be consolidated.

The addition of Owatonna Tool Co. to the group whose export trade will be handled by Borg-Warner International brings the number of organizations availing themselves of this service to sixteen, nine of them being Borg-Warner Divisions.

Post-War Equipment Trailers

In common with a great majority of manufacturers, La Crosse Trailer & Equipment Co., La Crosse, Wis., is devoting almost its entire facilities to the war effort so that it has been unable to do much for civilian customers. The company is, however, looking forward to the time when it can devote a portion of its facilities to the manufacture of civilian trailers for hauling heavy equipment. To this end a new booklet "Glimpses of La Crosse Trailers" has just been issued, depicting all of the types of trailers made by this company, and also taking you right into the machine shop where you see the trailers being made.

Copies of this booklet will be sent promptly to any readers who write direct to the manufacturer.

TORO
POWER MOWERS
All Over the World
TORO MANUFACTURING CORP'N.
MINNEAPOLIS, MINN.
HEADS UP FOR VICTORY!



Evidence that Hubers are built to last is this recent photo of "old 2301". . . the first 4-cylinder automotive type road roller ever manufactured. Today's Hubers, still going to our fighting fronts, embody many refinements in design and construction, and yet possess all the ruggedness which has kept this "granddaddy of 'em all" on the job for the past 22 years. Take our word for it . . . you'll never regret waiting for *your* Huber!

THE HUBER MFG. COMPANY ● MARION, OHIO, U. S. A.

HUBER ROLLERS

Treated-Timber Bridge Serves for 20 Years

A 437-Foot Structure of Creosoted Douglas Fir, Carrying Heavier Than Anticipated Traffic, Required Only Minor Repairs After Two Decades

✦ THE condition of a highway bridge after serving for 20 years under average traffic conditions, frequently much heavier than anticipated when the structure was built, and exposed to varying weather conditions, should form the basis for a reasonably sound opinion as to whether it is nearing the end of its useful life or whether it can be maintained economically for another 20 years. Such a structure recently inspected, which appears to fall in the latter classification, is the creosoted-timber bridge crossing the Sweetwater River on the Old Oregon Trail in Wyoming, about halfway between Casper and Rawlins, described in a recent issue of *Wood Preserving News*.

This bridge was inspected early this year when some minor repairs were necessary and, according to the *News*, W. B. Schilling, State Highway Department Maintenance Engineer at Casper, reported the structure in excellent condition. The repairs consisted mainly in placing six clamps on some stringers which had cracked longitudinally, but had not broken. These checks were attributed to the heavy loads to which the bridge has been subjected recently because of drilling operations in the vicinity, the loads now passing over the bridge being considerably in excess of the design load.

The clamps are simply U-bolts, ⅝ or ¾ inch in diameter, placed over the top of the stringer, with the bolt ends pointed downward and passing through a steel plate washer about 4 x 12 x ½-inch in size placed against the bottom of the stringer. These clamps, the report states, have been found very effective in the case of splits which, if left to progress, would materially impair the shear resistance of the stringer. Some shrinkage was noted in the floor plank this year, and the cracks were packed with oakum and asphalt.

Design of the Bridge

The Sweetwater River bridge is 437 feet long, made up of nineteen 23-foot spans on 4-pile bents, the piles ranging in length from 24 to 32 feet, with 3 x 10-inch x 22-foot sway braces. There are nineteen panels with nine lines of 6 x 18-inch x 24-foot stringers on 12 x 12-inch x 22-foot caps. The bulkheads at each end contain fourteen pieces 3 x 12 inches x 12 to 22 feet in size and two pieces 6 x 12 inches x 28 feet. The floor consists of 4 x 12-inch x 20-foot planks grooved for tight-fitting 1¼ x 1¼-inch splines and covered with a ½-inch mastic wearing surface.

All lumber in the structure is pressure-creosoted Douglas fir except for the guard rails which were untreated and painted white. The piles, bulkheads, stringers, bracing, and caps were treated by a standard empty-cell process with a final retention of 8 pounds of coal-tar creosote per cubic foot. The flooring, splines, posts, and felloe guards were similarly treated with 6 pounds per cubic foot.

Changes in Bridge Design

Construction practice in Wyoming has changed somewhat since this bridge was erected 20 years ago. Structural grade of timber is now specified instead of only select common, and a heavier design loading is used. For example, the stringers on the Sweetwater River bridge are 6 x 18 inches in size and spaced 2 feet 6 inches apart. On the present standard Wyoming 23-foot span, stringers 6 x 20 inches in size are specified, spaced 2 feet 2½ inches. If the same working strength were assumed for either type of stringer, which is questionable, the ratio of stringer strength furnished, per foot of width of bridge, old versus present standard, would be only about 72 per cent.

If, also, it is assumed that the old select common grade of timber had a working stress of only 1,400 pounds per square inch in extreme fiber as against the 1,600 pounds now used for structural grade, the above strength ratio drops to 63 per cent. Considering, therefore, the increased strength obtained in present-day bridges, and noting the excellent condition of the stringers in the 20-year-old Sweetwater River bridge despite the unforeseen heavy loads carried, *Wood Preserving News* points out the reasonableness of assuming that stringers in use today should give an exceedingly long life, with little maintenance.

Maintenance of Approaches

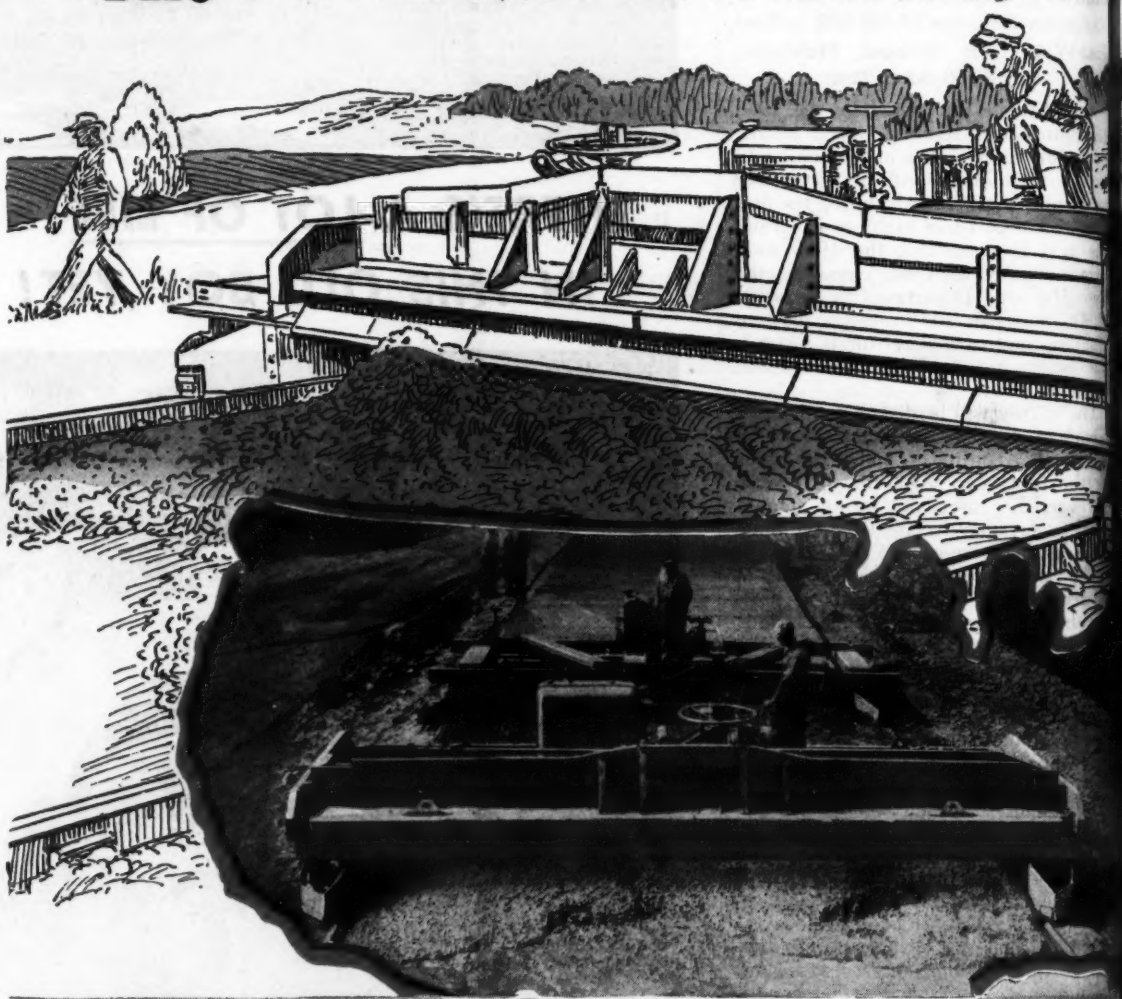
The Wyoming Highway Department reports that extra attention given to the maintenance of road approaches to the bridge is one of the best safeguards against stringer failures. This care eliminates the impact resulting from the "bounce" frequently noted at the end of a bridge.

W. H. Fisher is Bridge Engineer of the Wyoming Highway Department, with headquarters at Cheyenne. J. F. Seiler was Bridge Engineer at the time the Sweetwater River bridge was constructed.

Plans, Plans, Plans Still Needed Quickly

The period prior to the defeat of Japan should be used to get the construction industry ready for its post-war tasks. H. A. Dick of Portland, Ore., President of the Associated General Contractors of America, indicates that this will require the completion of plans for both private and public construction to the contract-letting stage as rapidly as possible, and the replenishment of the stocks of construction materials.

The OUTSTANDING CONTRIBUTION



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St. Johns — [illegible]

Miller Heads ARBA Division Of Highway Contractors

Burton F. Miller has been named Managing Director of the Highway Contractors' Division of the American Road Builders' Association, of which Charles W. Smith of Pensacola, Fla., is Division President. Mr. Miller has been with the ARBA for nine years and since 1940 has acted as an Executive Assistant to Charles M. Upham, Engineer-Director.

A graduate of law and a member of the bar of the District of Columbia, the new directing head of the largest organization in America devoting its entire efforts to problems of the highway contractor has been identified with the construction industry since 1933. Following a short period of private practice, Miller joined the Construction League of the United States, a federation of national associations in the construction field. Throughout this period, he was actively engaged in liaison work before the Congress and government departments.

The Highway Contractors' Division of the ARBA is planning a substantial expansion of activities in contemplation of post-war highway and airport construction.

Suction-Hose Catalog

Six grades of suction hose for excavating and general utility service are described, and cross sections of each illustrated in a 4-page catalog section issued by the B. F. Goodrich Co., Akron 18, Ohio. This line of hose features both rough and smooth-bore construction, and includes the patented Spiralock type with spiral wire reinforcements, for suction and discharge pressures up to 30 psi; Type 81 with interwoven wire and cord reinforcements and a smooth bore, for pressures up to 50 psi; and other types for a variety of working conditions. Sizes of each of the six grades are listed, together with outside diameters and net weight per foot. Auxiliary fittings are also listed and described.

Copies of Catalog Section 4600, punched ready for insertion in a loose-leaf binder, are available to readers of CONTRACTORS AND ENGINEERS MONTHLY upon application to the manufacturer.

Roads in St. Kitts, B.W.I.

In St. Kitts, Leeward Islands, British West Indies, there are 20 miles of treated macadam roads, 17 miles of water-bound macadam, and 23 miles of unimproved earth roads. Ten trucks and four taxis of the station-wagon type operate on the island.

Annual road appropriations by the Government include £6,500 for construction and £2,050 for maintenance, according to a recent issue of the *Foreign Commerce Weekly*.

BLAW-KNOX to Paving Equipment in 25 Years



6 plants of Blaw-Knox Company have been awarded the Army-Navy "E" for excellence

The Blaw-Knox CONCRETE SPREADER

Automatic Transverse Blade Type

FAST-EFFICIENT-ECONOMICAL

Here is the complete mechanical solution to the problem of spreading dry, harsh concrete mixes in large volumes at high speed. The Blaw-Knox Concrete Paving Spreader, first used on the Pennsylvania Turnpike in 1940, has proved itself indispensable to contractors for high production, low-cost paving work all over this country as well as abroad. It spreads concrete uniformly and accurately. With the pavement vibrator added, this one-man operated machine spreads and consolidates the concrete in a manner to satisfy the most exacting specifications.

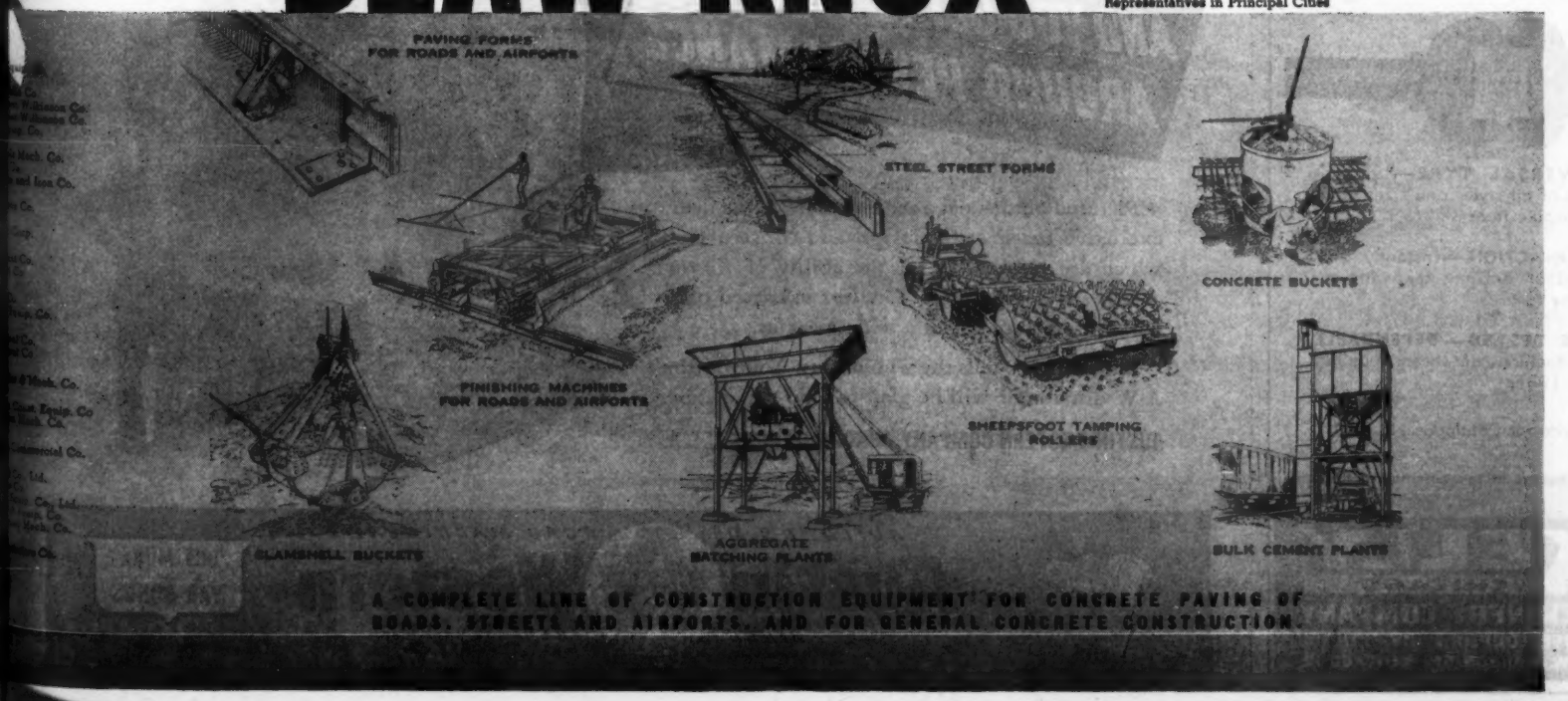
300 Linear Feet of 22 Foot Width Slab per Hour

And that's not exceptional performance for the Blaw-Knox Concrete Paving Spreader — it's normal. On airport or highway paving construction this machine will handle the maximum output of two dual drum 34-E Paving Mixers. A Blaw-Knox Finishing Machine is the perfect team-mate for the Blaw-Knox Concrete Paving Spreader.

Your nearest Blaw-Knox Dealer will handle your inquiries promptly.

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OF BLAW-KNOX COMPANY
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This device holds a file at any angle for filing edges of plates.

Handy Tool Devised For Beveling Edges

A new type of edging tool has been invented by Tip A. Hicks, Sr., employed in the tool-manufacturing department of the Glenn L. Martin Co., Baltimore, Md. This tool averted a bottleneck in the output of B-26 Marauders and was developed when production on the prize-winning medium bomber was being rushed in an effort to get Army deliveries under way before war actually struck the United States. This is another "now it can be told".

Tip Hicks, a veteran tool maker though a newcomer to the plant, saw plates piling up by the hundreds on the lofting tables, and worried about it. Without telling anyone, he quietly devoted his spare time to producing a small, handy tool which would hold a file at any specified angle and which could be attached either to a rigid bracket or a movable carriage. Even an unskilled workman can use it to bevel metal or other materials with perfect accuracy.

Hicks made a number of these tools, loaned them to fellow employees, and considered the incident closed. During most of his sixty years, he had always been quick to lend a hand whenever things went wrong in forge, mine, or shop. Although it was good to know he could still show the younger fellows a trick or two, he expected no special credit for it. He was therefore surprised and pleased when the Martin Co. took steps to obtain a patent for him on the new edging tool, which it felt would be equally useful to workmen in many industries. The patent has just been granted. Hicks has assigned it to the Martin Co. and will share in the royalties after a license to manufacture the tool has been awarded to an appropriate firm.

New Vice President Of Penn Metal Corp.

Lt. Col. Hubert E. Snyder, recently returned to inactive status by the Army, has been appointed Vice President of the Penn Metal Corp. of Penna., in charge of the Corrugated Metal Pipe Division, with headquarters at the company offices at Oregon Ave. and Swanson St., Philadelphia 48.

For twelve years previous to his service in the Army, Mr. Snyder was Vice President and General Manager of the Shelt Co. of Elmira, N. Y., a large fabricator of corrugated-metal pipe.

New Illustrated Booklet On Dirt and Rock Moving

A new 32-page booklet containing illustrations in natural color, as well as black and white, of sixteen mine and quarry operations in all sections of the United States has been issued by The Euclid Road Machinery Co., Cleveland 17, Ohio. This booklet "Euclid Trucks in Mines and Quarries" highlights typical applications of rear-dump and bottom-dump Euclids in open-pit work.

Copies of the booklet may be secured direct from Euclid but, because of the limited supply available as a result of paper curtailment, Euclid will be able to honor requests only from those who use off-the-highway equipment for moving earth, rock, or coal, and who mention CONTRACTORS AND ENGINEERS MONTHLY.

When the War Ends—

We will re-solicit your orders to make rapid, large-scale Aerial Surveys of

Highways, rivers, railroads, rights of ways, etc.

Until then we are engaged wholly on work for the Government.

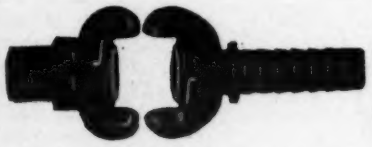
CHICAGO AERIAL SURVEY COMPANY

332 South Michigan Ave. Chicago 4, Illinois

KELLY HOSE COUPLINGS

TROJON AIR HOSE COUPLINGS

MALLEABLE IRON—RUST PROOFED



UNIVERSAL TYPE—Locking heads of all styles and sizes interchangeable from ¼" to 1".

QUICK-ACTION—Instantly connected or disconnected with one quarter turn.

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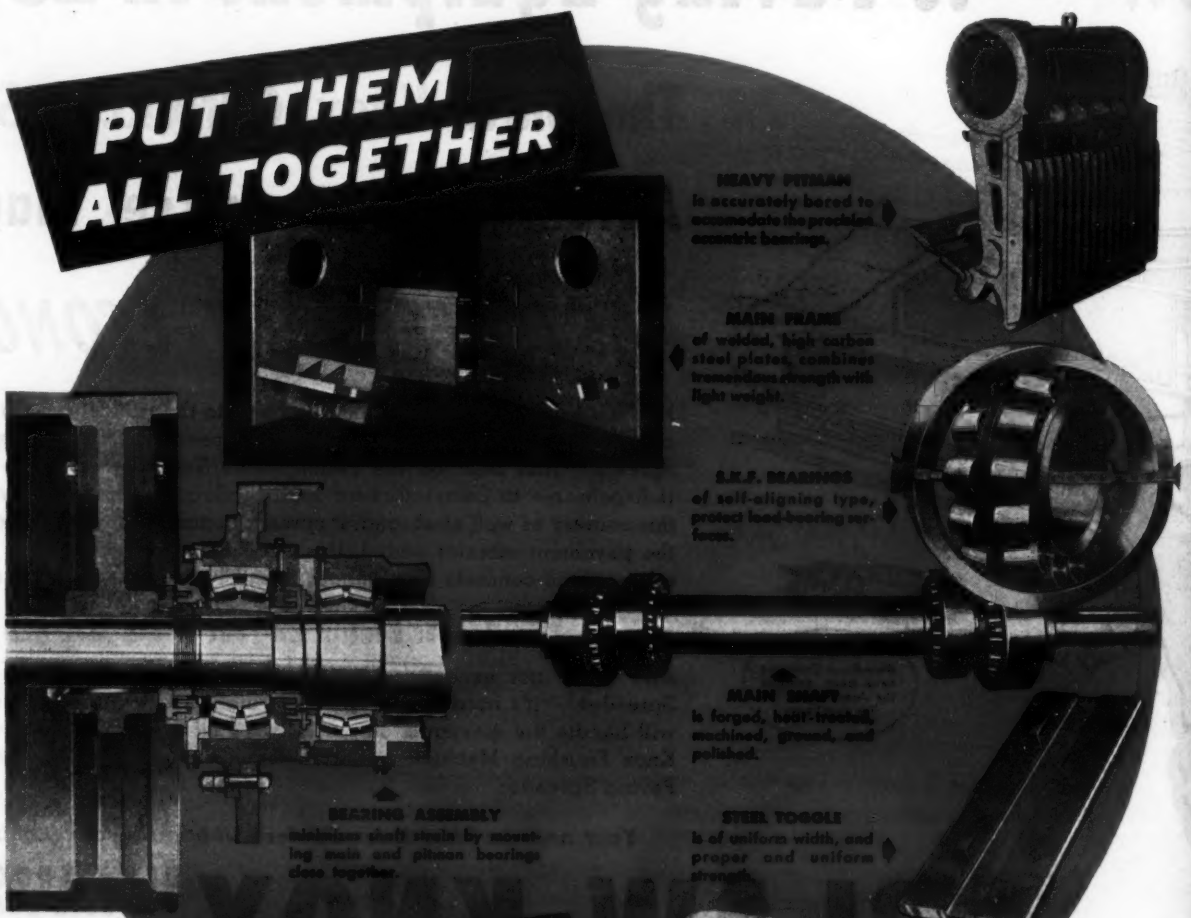
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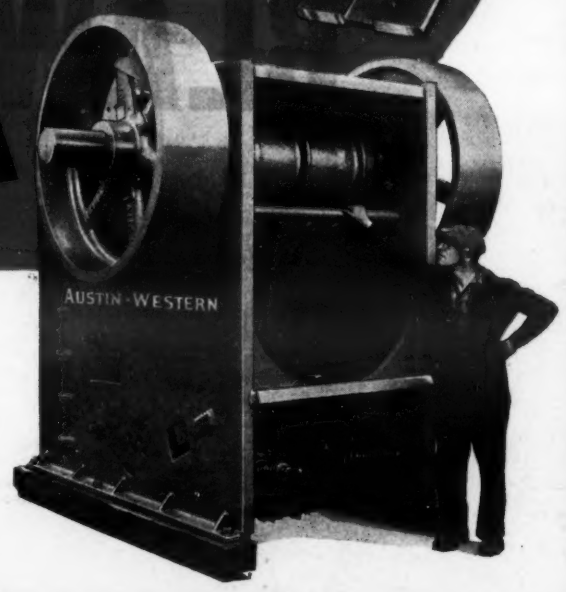
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Post-War Highways Planned To Serve Large Urban Areas

Public Roads Administration Lists Thirty-One Major Expressway Projects in Fifteen Metropolitan Areas

♦ PROJECTS aggregating hundreds of millions of dollars are slowly progressing towards the completed-plan stage to provide the major metropolitan areas in the United States with modern expressways. While $473,000,000 is the estimated construction cost of all state highway plans now completed, only $84,000,000 of this is in urban areas. Much remains to be done by the cities themselves if the plans are to be ready for the starting gun—the last shot that ushers in the true V-Day. The Public Roads Administration lists the major urban projects which total thirty-one in fifteen urban districts. To this, Baltimore may be added with the proposed $40,000,000 mid-city expressway which is still in the debating stage.

Boston and Buffalo

Plans for post-war highway improvement in Boston, Mass., call for completion of links in the outer circumferential expressway, on which work was started several years ago, and the construction of access routes leading to business and industrial districts. The recent report of the Massachusetts Post-War Planning Commission to the State Legislature has done much towards coordinating plans for the Boston metropolitan area.

Preliminary plans have been completed in Buffalo, N. Y., for two major projects. The first is a $7.500,000 parkway along the Niagara River and the second a throughway which will skirt Buffalo to the south. Plans for the latter were developed by the State Department of Public Works as part of a state-wide arterial route over 400 miles in length which will extend north-south along the west side of the Hudson River, east-west across the state, and southwest from Buffalo to the Pennsylvania state line, connecting most of the principal cities in the state.

Chicago

An overall study of transportation problems and traffic conditions has been conducted in Chicago over a period of years, under the direction of the City Department of Subways and Superhighways, the City Planning Commission, and the Cook County Highway Department. These agencies at present are directing their efforts towards the completion of plans for a $45,000,000 controlled-access highway, to be known as the Congress Street Superhighway, which will run from Michigan Avenue west to the city limits and eventually will be extended to Elgin, Rockford, and other important industrial centers. The project has been divided into three sections in order to speed up the preparation of plans and specifications. One section is being designed by city engineers, one section by the Cook County Highway Department, and the third section by the Illinois Division of Highways. Steps already have been taken to acquire property for the right-of-way.

Cleveland and Detroit

Further expansion of the expressway construction program which was started prior to the war is the primary concern of Cleveland planning authorities and city engineers. Work is under way on plans for the extension of two existing expressways, at a cost of approximately $25,000,000.

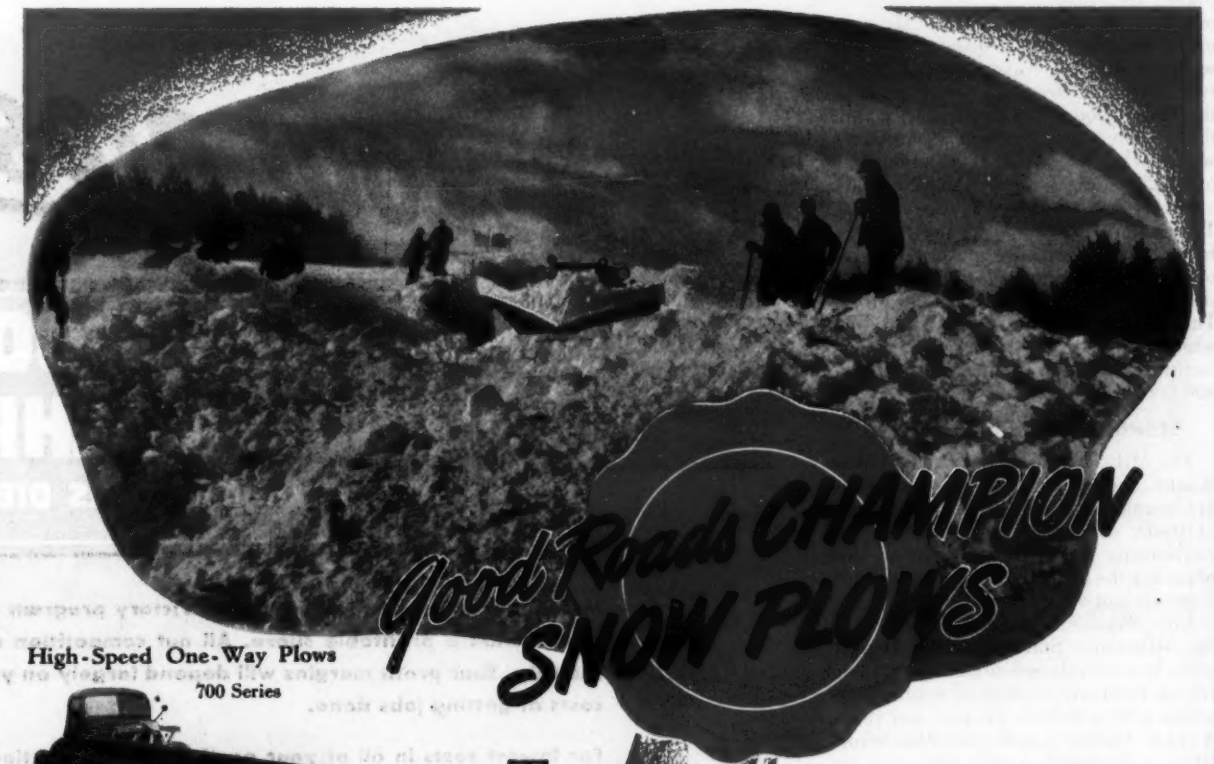
Broad plans for the development of expressways through Detroit have been under study for a decade or more. The City Planning Commission, the City Engineering Department, the Wayne County Road Commission, and the Michigan State Highway Department have worked together closely in the preparation of plans for post-war construction. The program at present calls for an annual expenditure of $1,500,000 by the City, an equal amount by Wayne County, and $3,000,000 by the State of Michigan. These allocations, matched with Federal funds, will give Detroit a post-war highway construction program of approximately $12,000,000 annually over a 12-year period.

Plans for two major projects in Detroit, the John C. Lodge Expressway and the Crosstown Expressway, are well advanced. The proposed John C. Lodge Expressway, designed by the Wayne County Road Commission, will be a six-lane controlled-access highway extending northward from the city's waterfront for a distance of approximately 12 miles. Construction of a 3½-mile section through the downtown district, at a cost of approximately $18,500,000, is expected to start as soon as materials and labor become available.

Plans for Detroit's Crosstown Expressway are being prepared by the Michigan State Highway Department. This expressway will provide an east-west route across the city, connecting

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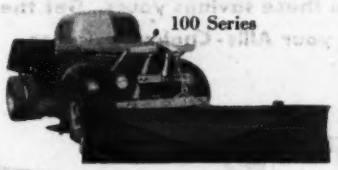
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Urban Highways

(*Continued from preceding page*)

the proposed John C. Lodge Expressway with the existing Detroit Industrial Expressway which serves the Willow Run bomber plant near Ypsilanti. The section to be constructed immediately after the war will cost approximately $15,000,000.

Preliminary plans also are being drafted for an expressway along Hastings Avenue from Jefferson to Six Mile Road, a distance of 6.8 miles, and several other expressways to connect principal routes of travel through the city. The entire program calls for an outlay of approximately $150,000,000 over a period of years.

Los Angeles

The City of Los Angeles, with the cooperation of the California Division of Highways and other agencies, has made excellent progress in the development of plans for arterial-highway improvements in the post-war years. City engineers and the State Division of Highways are drafting construction plans for two major expressways, designated as the Hollywood-Santa Ana Parkway and the Arroyo-Seco-Harbour Boulevard, which will help to untangle the snarl of traffic along heavily traveled boulevards in the vicinity of Los Angeles. These expressways will be four and six-lane controlled-access highways. Rights-of-way along some sections of the proposed routes already have been acquired. The Hollywood-Santa Ana Parkway, for which plans are most advanced, will be completed at an estimated cost of $38,000,000.

Milwaukee and Minneapolis

The Milwaukee Department of Public Works and local planning authorities are engaged in a comprehensive study of traffic conditions and proposed improvements in transit facilities, but plans for the actual construction of highways are not very far advanced.

City engineers of Minneapolis and the Minnesota State Highway Department have developed preliminary plans for an extensive system of expressways which will be built in the post-war years. A new bridge across the Mississippi River is included in the proposed improvements.

New York City

New York City has developed a larger program of post-war arterial improvements and has plans in more advanced stages of preparation than any other city in the country. Express highways constructed years ago in the suburban areas of Westchester County and Long Island and expressways built by the City in recent years, notably the Henry Hudson Parkway, the Gowanus elevated expressway, and the Grand Central Parkway, clearly demonstrated the value of controlled-access highways in facilitating the movement of through traffic in congested urban areas. The City Planning Commission, the Department of Parks, the New York State Department of Public Works, and the public works departments of the various boroughs are engaged in the development of post-war plans for a comprehensive system of expressways to supplement and extend existing expressways. The cost of projects for which construction plans are now being drawn is estimated at $91,000,000.

These projects include an expressway through the Bronx which will serve as a link in the New England throughway from New York to Boston; an east-west expressway through the Bronx, extending from the George Washington Bridge across the Harlem River to Pelham Bay Park; the Major Deegan Boulevard, a north-south route which will parallel the Harlem River from the south end of the Bronx, near the Triborough Bridge, to the northern city limits; the Van Wyck Avenue expressway, to connect Jamaica with the Southern Parkway in Queens; the Bronx River Expressway, a north-south arterial route connecting the southern section of Bruckner Boulevard and the Boston Post Road; and the Prospect Avenue expressway in Brooklyn, which will carry traffic from Ocean Parkway to the Gowanus elevated expressway, making the entire Flatbush area accessible to the future Battery Tunnel.

New Orleans and Philadelphia

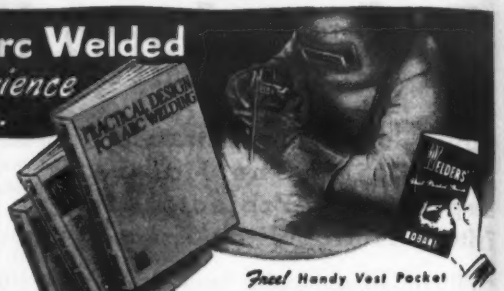
Plans for post-war highway construction in New Orleans are still in the preliminary stages. Traffic studies are under way to determine most-needed improvements. The proposed projects include an east-west expressway to speed up the flow of traffic on U. S. 90 and a north-south arterial route through the heart of the city to connect with a bridge which will be built across the Mississippi, linking New Orleans and Algiers. Traffic at this point is now handled by ferry.

Preliminary plans are being prepared by Philadelphia for the construction of the Penrose Ferry Bridge and approaches across the Schuylkill River, to provide better access to the Industrial Highway, a main artery of travel that

(*Concluded on next page*)

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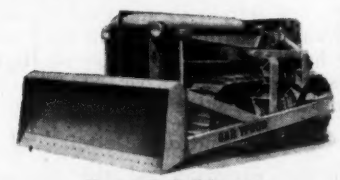

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Urban Highways

(*Continued from preceding page*)

has been in use several years.

Pittsburgh and St. Louis

Consulting engineers have been engaged to prepare plans and specifications for a $25,000,000 expressway starting east of Pittsburgh to connect U. S. 20 and U. S. 30 with the downtown business district of the city. Construction plans are about 85 per cent complete.

City engineers of St. Louis and the Missouri State Highway Department are drafting preliminary plans for a network of expressways through and around the city and the construction of a new bridge across the Mississippi River. One of the proposed expressways will extend from the waterfront side of the business district to the southwest section of the city, and another will carry traffic from the midtown section northwest to the municipal airport.

San Francisco

The California Division of Highways is preparing plans for three controlled-access highways in the San Francisco Bay area. One expressway, to be known as the Bayshore Freeway, will be built along the west shore of the bay from the western terminus of the Cross Bay Bridge in San Francisco to San Jose. Surveys of the proposed route are being made and portions of the right-of-way have been acquired. A companion project on the east shore of the bay, between Oakland and San Jose, which also will be known as the Bayshore Freeway, is in advanced stages of planning and the right-of-way is being acquired as rapidly as possible. The third project calls for improvements to an existing highway running north along the bay shore from the Cross Bay Bridge through Oakland to Berkeley, which will be converted into a controlled-access highway.

Washington, D. C.

With numerous bottlenecks clogging the movement of traffic from Washington to Virginia highways even before the city's population was multiplied by the influx of government workers and military personnel, the District Commission has under consideration plans for an $18,000,000 highway and street improvement program. The four principal projects, now in preliminary stages of planning, include the construction of a viaduct on K Street to Key Bridge, over which traffic flows into Virginia; an expressway along K Street east from Twelfth Street; a new bridge to replace the narrow and obsolete Fourteenth Street Bridge across the Potomac, which is used by a major portion of the traffic to Virginia and points south; and a bridge and approaches across the Anacostia River at the end of South Capitol Street.

One-Third More Cash For Secondary Roads

During the fiscal year beginning July 1, the secondary-highway system of Virginia will receive $8,500,000, equal to the greatest amount ever distributed to this system. This sum, exceeding by $2,500,000 the allocation for the past year, is in line with the policy of the Commission to place greater emphasis on secondary-road work.

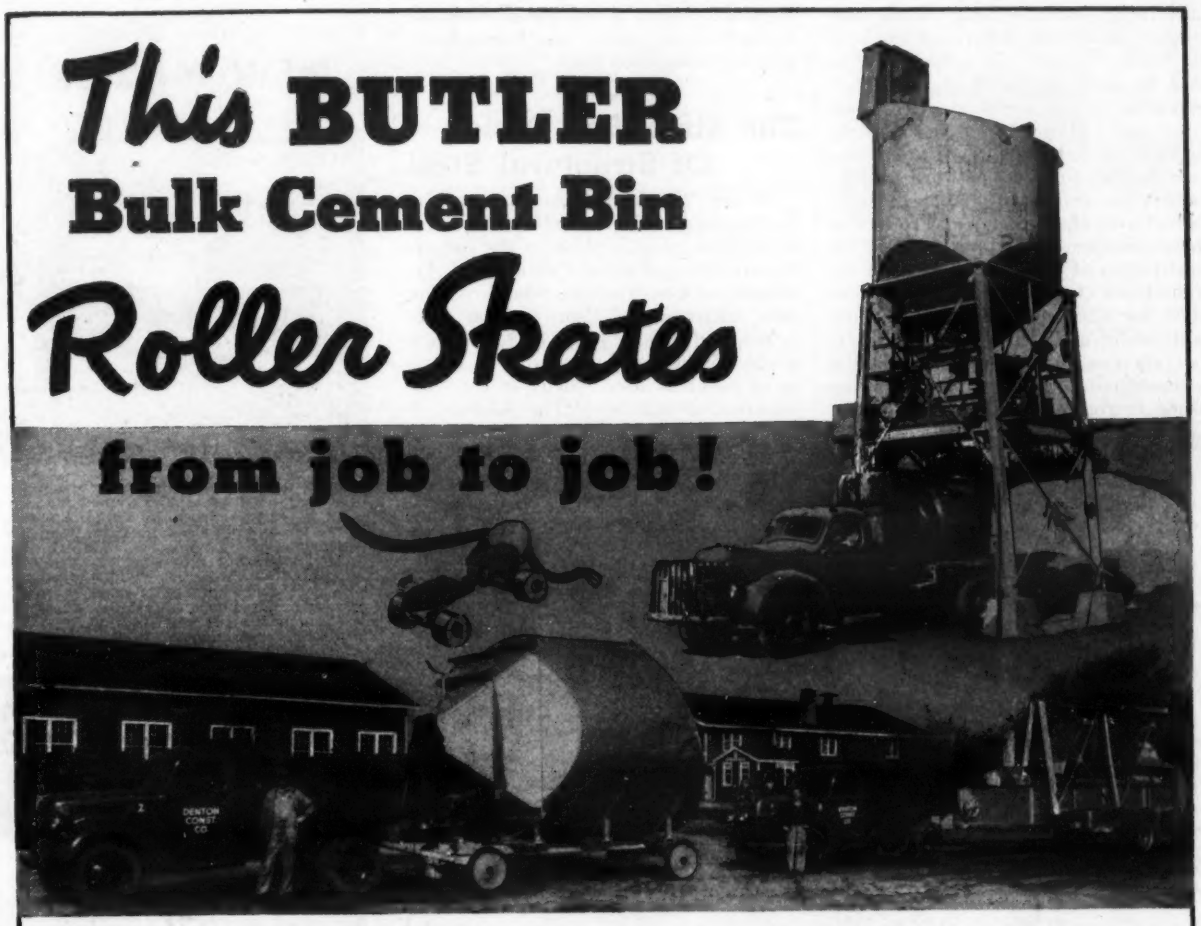
The $8,500,000 is to be distributed on the basis of $5,000,000 for maintenance and supplies, and $3,500,000 for improvements. Of the total, $350,000 is from the revolving bridge and adjustment fund. The funds are allocated to the counties on a four-way ratio based on vehicle-miles, rural population for 1940, rural area, and rural secondary-road mileage.

Virginia has 9,379 miles in its primary-highway system and 37,200 miles in its secondary-highway system which comprises all of the county roads in 97 of the 100 counties taken over by the State in 1932 and now maintained and reconstructed entirely by the State.

Isaacson Announces Officer Appointments

Paul Isaacson and Ted Isaacson have been elected to the Board of Directors of the Isaacson Iron Works, Seattle, Wash., according to a recent announcement, which states that Ted Isaacson will also serve as Vice President. Paul Isaacson is President of the Young Iron Works. Other appointments include C. Harold Blomgren, who has been made Treasurer, Harry D. Larson appointed Manager of the Tractor Equipment Division, and George S. Allen, Manager of Mechanical Engineering.

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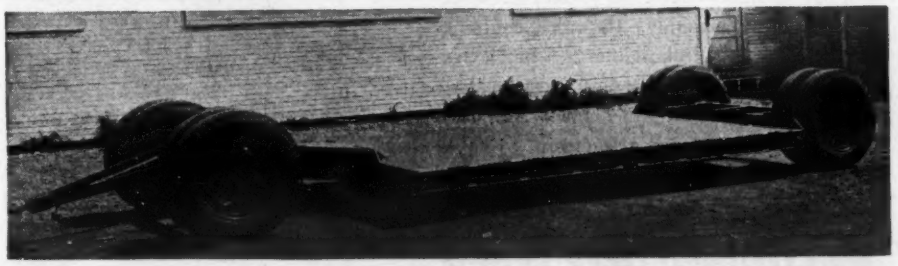
Thirty-five jobs served in four years is pretty good evidence that Butler designs such plants with a planned portability that a traveling circus might envy. Add to that, — strength and durability to take the ups and downs of life on the road without faltering in production. In its thirty-five stellar performances this plant has handled over 250,000 barrels of cement, — a handsome record in itself!

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Reclamation Engineers Ready for New Work

Intensive operations locally as well as in the Denver and Washington offices of the Bureau of Reclamation, looking towards early resumption of construction on the uncompleted Central Valley structures in the San Joaquin Valley in California, are under way. While construction of certain features of the Central Valley Project was halted early in 1942 by order of the War Production Board, due to wartime shortages of manpower and materials, Charles E. Carey, Regional Director of the Bureau, reports that pre-construction work on these features has continued unabated.

Mr. Carey states that War Production Board clearance has been granted on construction of the first 5.6 miles of the Friant-Kern Canal. Bids have been called for and were opened at Friant, Calif., at 10 a. m., July 18. The large-scale surveys and other work essential to construction, already done or being rushed to completion, will prevent any lag in getting down to actual construction on this and other features of the Central Valley Project when the green light is shining.

The Central Valley Project structures yet to be built, which will bring water to San Joaquin Valley, are among the largest of those authorized to date. They include the Friant-Kern Canal, Delta-Mendota Canal, Delta-Cross Channel, Delta pumping plants, and Shasta-Delta power transmission lines.

The Simplified Design Of Structural Steel

A new 226-page pocket-size volume on the design of structural steel has recently been published under the authorship of Harry Parker, Professor of Architectural Construction, School of Fine Arts, University of Pennsylvania. This is the fourth in a series of elementary books dealing with the design of structural members used chiefly in the construction of buildings. The solution of many structural problems is difficult and involved, but it is surprising, on investigation, how readily many of the seemingly difficult problems may be solved. Professor Parker has endeavored to show how the application of the basic principles of mechanics simplifies the problems and leads directly to a solution.

"Simplified Design of Structural Steel" is fully illustrated with diagrams and contains twenty-nine tables of great value to the structural-steel man. It is published by John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y., and sells for $2.75 postpaid.



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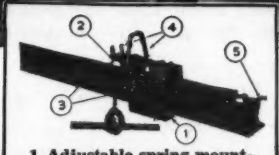
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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Contractor Unwittingly Assumed More Liability Than He Intended

Anyone who undertakes to phrase a construction contract from a contractor's standpoint should be intensely interested in studying the opinion rendered recently by the Indiana Supreme Court in the case of Freigy v. Gargaro Co., Inc., 60 N. E. 2d, 288. The opinion shows how a contractor, wittingly or unwittingly, may assume broader liability to third parties than obligations to the owner require.

The defendant contracting company constructed a trunk sewer in a Fort Wayne street for the City, the sewer being laid 60 feet below the surface. The plaintiff, owner of abutting property, sued the company for damages due to settling of a building, support of which allegedly was weakened by drainage of the water table in the subsoil beneath the street. The trial court ruled that the complaint filed by the plaintiff failed to state any liability on the part of the company. Therefore, the case was ordered dismissed without further trial or hearing. But, on an appeal taken by the plaintiff, the Supreme Court decided that if she should be able to prove the facts alleged in the complaint she would be entitled to collect damages. Accordingly, the case was sent back to the trial court in Fort Wayne for further proceedings.

Defectively Worded Contract

The case turned upon a clause in the sewer construction contract reading:

"The Contractor * * * *agrees to pay all damages* for injury to * * * property * * * growing out of *any act or deed* of the Contractor * * * or of any of his subcontractors. * * * The Contractor hereby agrees to indemnify and save the City of Fort Wayne harmless against all suits * * * brought against the City * * * on account of any such injuries," etc.

In deciding the case, the Supreme Court started with a recognition of these basic rules of law: Public work resulting in withdrawal of lateral support of abutting premises does not constitute a condemnation of property, for which the Constitution requires payment of just compensation. In the absence of negligence in planning or constructing the public work resulting in withdrawal of lateral support, the abutting owner has no remedy. Then the court said:

"The contract before us must be deemed to have been executed with knowledge of the law above stated. But the contractual provisions are not necessarily limited or controlled by these principles, for frequently the purpose of a contract is to give rights or relief not otherwise existing."

After considering the entire contract clause in detail and its various elements in relation to each other, the court decided that *negligence* or other *wrong* on the contractor's part was not essential to liability; that the contractor was liable for any injury to abutting property. Thus it will be seen that it was unfortunate from the contractor's standpoint that one more word was not inserted in the clause above quoted. In short, the contract should have read: "The Contractor * * * agrees to pay all damages for injury to * * * property * * * growing out of any *wrongful* act or deed of the Contractor," etc.

Would Other Courts Concur?

We are not sure that all courts would concur in the view expressed by the Indiana Supreme Court, that the contractor was liable regardless of fault, especially in the light of the following statement in the opinion which was handed down.

"A possible explanation of the broad scope of the contract is that *the author, in his zeal to protect the City,* expanded his language beyond the necessity for such protection *without conscious thought that he was creating a liability available to a third party beneficiary.* But appellee"—the contractor—"cannot take advantage thereof. It had ample time to apprise itself of the *legal effect of the language* before the obligation was incurred."

Of course, it is fundamental that a valid contract is the product of the *mutual intent* of the two parties, and that a third party cannot claim benefits under an agreement unless it is clear that the two contracting parties have agreed that such benefits shall accrue to the third party. So, we believe that at least some courts, if not most of them, would agree with the decision of the trial judge in the Indiana case, rather than with the conclusions of the Supreme Court.

Once it be conceded that the contract was drawn on behalf of the City "without conscious thought that" it "was creating a liability available to a third party beneficiary," we must say that the City never intended to exact from the contractor such liability, in the absence of fault on the contractor's part. Then, if the City's lawyer or other representative was not conscious that the wording used by him would be construed as imposing any such liability, how could the contractor be deemed to be at fault in placing the same interpretation upon the language used in the contract?

We believe that many judges would regard as being defective the reasoning of the Indiana court, to the effect that the contractor was bound to foresee that the Supreme Court ultimately would put upon the wording of the contract a meaning contrary to that ascribed by the contracting parties themselves.

Truck-Mixed Concrete And the Sales Tax Law

How judicial and legislative changes of mind can complicate legal problems is interestingly illustrated by a case lately decided by the Michigan Supreme Court.

Several years ago, the plaintiff, a dealer in ready-mixed concrete delivered to the forms on construction jobs, sued to establish his right to a refund of sales taxes that had been exacted from him under the then existing law of Michigan. By a seven-to-two vote the Supreme Court decided in 1942 that the moment the concrete was dumped into the forms it ceased to be personal property, becoming part of the real estate, and was therefore not subject to sales tax. (Metzen v. Brown, 3 N. W. 2d, 870.) But in 1943 the Supreme Court decided, in a suit between other parties, that an amendment of the sales tax law in 1939 had the effect of

(*Concluded on next page*)



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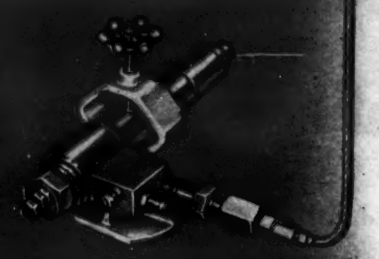


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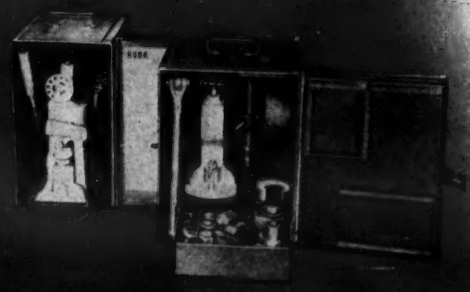


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Tests all nozzles and injectors— Right at the Engine!..



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Avoid Legal Pitfalls

(*Continued from preceding page*)

subjecting to the tax material incorporated into construction jobs. (R. C. Mahon Co. v. Department of Revenue, 11 N. W. 2d, 280.)

Having established his right to a refund in the first cited case, the plaintiff brought a new suit to collect. Judgement was rendered in his favor for a limited amount. Defendant appealed and plaintiff cross-appealed, claiming that the amount awarded was insufficient. Disposing of the case Feb. 20, 1945, the Supreme Court decided (Metzen v. Department of Revenue, 17 N. W. 2d, 860):

By reason of the decision reached in the first case above cited, the plaintiff became entitled to sue for and collect taxes paid by him on sales made within six years *before* the 1939 amendment took effect. But insofar as that decision declared the plaintiff's right to recover taxes on sales made *after* the amendment took effect, the decision was abrogated by the opinion in the Mahon Co. case, which recognized that the amendment made taxable materials incorporated into construction jobs.

The Supreme Court applied this well-established rule of law: Where a court of last resort changes a previous decision on a proposition of law, the change operates to destroy the old rule of law, *as of the time when the previous decision was reached*, with certain exceptions. One exception is that the new decision does not alter the rights of parties to the particular action in which the original decision was rendered. Another exception is that the courts will not so apply the new decision to situations which had previously arisen where it would unjustly prejudice parties who relied upon the rule as originally declared by the court.

Liability for Failure Of Specified Materials

The mere fact that a contract requires a contractor to use a specified brand of material does not necessarily relieve him from liability to the owner for resulting defects in the completed job. He is not in the legal position of a retail dealer in materials who *sells* them without warranting their quality, durability, etc.

Application of this point of law is illustrated by a case lately decided by the Rhode Island Supreme Court, where a painting contractor agreed to furnish labor and materials required to paint a structure. The specifications required the use of materials designated by trade name. The decisive fact of the case was that the contract contained a clause guaranteeing the material and workmanship for 15 years and providing for replacement of "all faulty or defective material or workmanship free of charge", within that period, "upon written notice".

Within a month after the job was completed, the paint commenced to crack and peel. The contractor failed to remedy the situation, although some ineffectual efforts were made on the owner's repeated complaints. The owner sued for damages and won the suit. (Borland v. Clifford, 41 Atl. 2d, 310.) But the court made it clear that it was the contractor's guaranty, above mentioned, that nailed him. No court would be apt to say that a contract requiring a contractor to use specified materials implies a warranty that the materials will "stand up", unless it appears that the contractor has done something that amounts to an assurance to the owner that, properly applied, they will produce a good job.

Rights of Contractor In Claims for Extra Pay

Where a state highway contractor asserted a right to pay on numerous items which the State of New York refused to pay, the New York Court of Claims decided (R. H. Cunningham & Sons Co. v. State, 52 N. Y. Supp. 2d, 65):

A state employee charged solely with county maintenance of roads could not bind the State by directing the contractor to do work not called for by the contract.

No allowance could be made where the effect would be to allow an item for which no claim had been duly filed within the time required by law.

The contractor was entitled to pay for work not contemplated by the contract but necessitated by changes in plans made by the State.

The State was liable for appropriation to its own use, without the contractor's consent, of materials on the site belonging to the contractor.

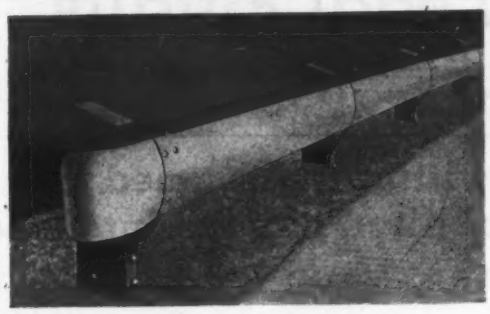
The State was also liable for changes and re-excavation ordered by its engineer after work had been approved as having been fully and satisfactorily done, and for work necessitated by the engineer's error in setting out directions on a survey basis, for which the contractor was blameless.

Subcontractor Hedges On Pre-Bid Agreement

A decision that deserves study by every contractor was rendered by the South Dakota Supreme Court in a case where subcontractors repudiated an agreement to do a certain part of the work on a government air-base job if the plaintiff, a contracting company, should become a successful bidder for the job. Plaintiff afterwards secured the principal contract, but the defendants contended that there was no binding agreement on their part, and claimed that the agreement lacked mutuality in that it did not bind the plaintiff to bid for the job.

There is a general and fundamental rule of law that there must be mutuality of obligation before there can be a valid contract. But the opinion of the Supreme Court shows that where there has been no retraction of a promise such as was made by the defendants in this case before the other party has undertaken obligations to a third party on the faith of that promise, it would be unjust to permit the promisor to repudiate his agreement afterwards. (Northwestern Engineering Co. v. Ellerman, 10 N. W. 2d, 879.) The court quoted the following rule laid down by a standard legal authority, "Restatement of the Law, Contracts":

"A promise which the promisor should reasonably expect to induce action or forbearance of a definite and substantial character on the part of the promisee and which does induce such action or forbearance is binding if injustice can be avoided only by enforcement of the promise."



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Read, at the left, the plain evidence of how Ford engineering saves your time and your money. And bear in mind that Ford high-precision manufacture, founded on accuracy standards measured in millionths of an inch, provides a better truck to begin with, and makes installation of new parts quick and easy.

Today, truck servicing means more than ever before—and after the war the importance of Ford low maintenance costs will be still greater.

Under government allocation, present production of Ford Trucks is necessarily limited, as to types, quantities and equipment, for essential civilian needs. See your near-by Ford Truck dealer for friendly counsel in obtaining official certification of your requirements.

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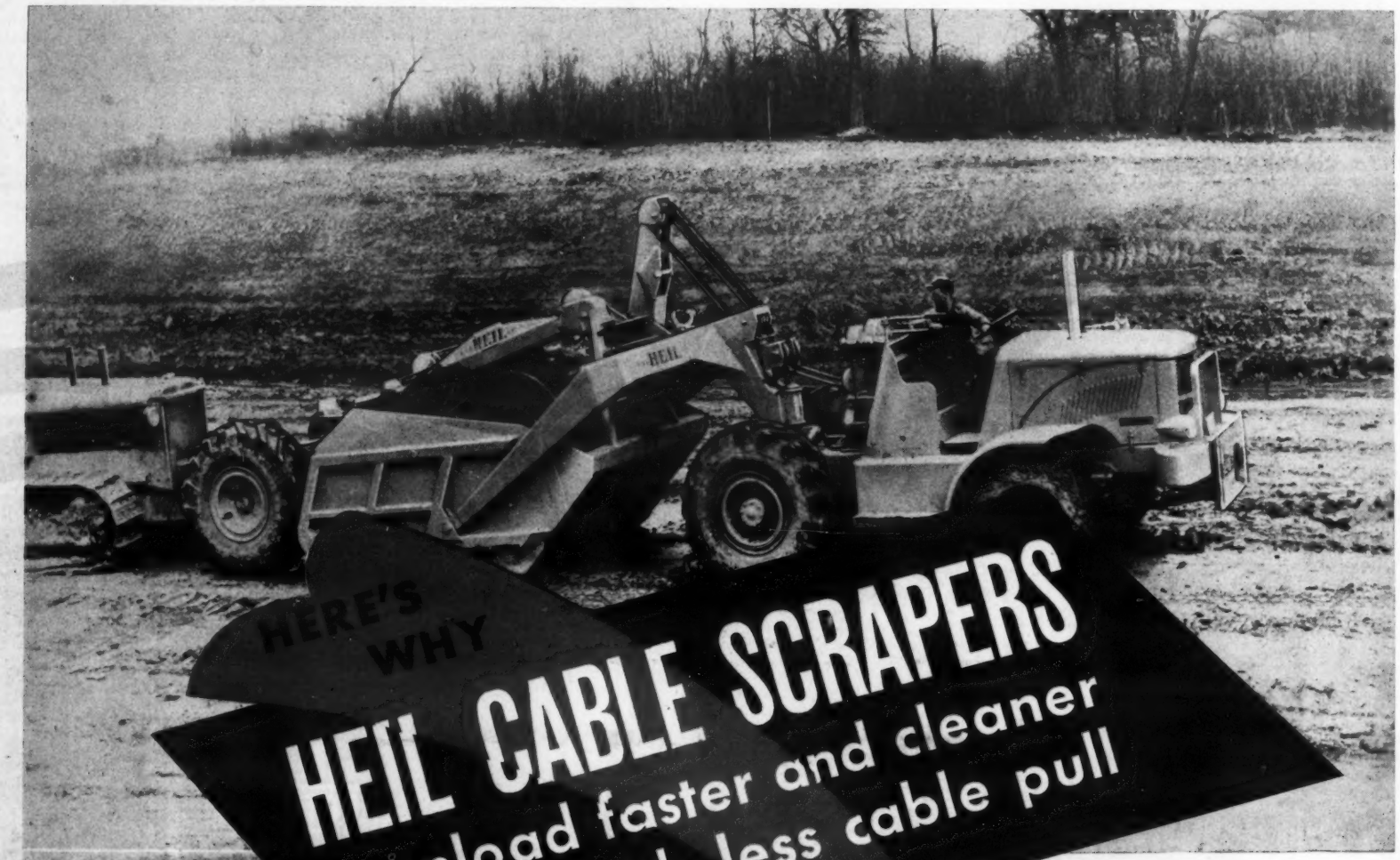
Aeroil Adopts New Name

The organization formerly known as the Aeroil Burner Co., West New York, N. J., is now designated as the Aeroil Products Co. The change was made to eliminate any possibility of misunderstanding, since Aeroil products have been expanded during recent years to include electrical as well as oil-fired and gas-fired industrial equipment. In addition to continued production of Heet-Master bituminous kettles and No. 99 weed burners and maintenance torches, the company has plans for post-war production of new types of equipment now in process of development or already in production for the Army and Navy.

Aeroil maintains branch offices and warehouses in San Francisco, Chicago, and Dallas, and plans the reestablishment of its extensive export business after the war. Plant No. 1 of this company received the Army-Navy "E" award in 1944.

High Shovel Production

According to the most recent report of the Construction Machinery Division, War Production Board, more than 10,000 self-powered cranes and shovels were shipped by manufacturers during 1944. This is nearly three times the annual average of the period 1937-1941, and throughout 1944 unfilled orders represented over one year's production at current rates and four years' production at 1939 levels. Over 97 per cent of the total output went to the military forces. These data, prepared by the Bureau of the Census, represent twenty-six companies, or 100 per cent of the industry.



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Heil engineers have done a thorough job of designing this big-capacity cable-scoop. You get speed, flexibility, and scientific weight distribution — to help you get bigger yardage at lower cost, along with a reputation as a successful operator.

Unloading clean and fast with less cable pull is only one of many features that give you maximum yardage per hour — maximum productive hours on the job. Write for bulletins describing famous Heil design features such as correct bowl design, scientifically located draft-pivot point, fulcrum-type lift, all-welded construction, etc., or —

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Tilting Floor Push-out

About a third of the load rolls out by gravity, through high-opening front apron. Balance is ejected by moving the tilting floor upward and forward. Hinged tilting floor scrapes sides of bowl clean, hinged section at rear scrapes back sheet clean. Dirt has no chance to stick.



Tilting is easier than pushing

It requires less power to raise and dump a load than to slide it forward against friction. Tilting also gives greatest leverage at the start of the unloading cycle, when load is heaviest — and a speed-up as the load is dumped, maintaining an even discharge.



Correct Bowl-Loading Action

Ordinary scrapers with a square-back bowl load with a void in the rear if operator stops digging when crown of dirt shows over top of bowl, resulting in less payload. Heil Scoops have the two features which make for good boiling action (1) correct pitch of cutting blade (2) correct shape of bowl.



Getting Longer Life From Dragline Cables

Better Service Through Proper Installation and Lubrication of the Correct Size and Type of Wire Rope

By PETE H. TURSI, General Superintendent, Kaw Paving Co., Topeka, Kans.

♦ DOUBLING the life of wire ropes on draglines is merely a matter of applying the rules and suggestions set down by wire-rope manufacturers and equipment manufacturers. Yet there come to us a lot of machine operators who know the rules, but fail to apply them. Many of these men were trained in the old school when the policy was to use a rope "till she broke". Very few operators of ten years ago knew the full value of on-the-job maintenance and rope service.

Our rules regarding cables for draglines and other similarly equipped machines require a complete inspection of the whole rope track, including groove treads, sheaves, sheave bearings, drums, alignment, etc., before a new rope is put on. If repairs are needed or a drum surface or sheave groove needs rebuilding, this work must be done before the new rope is installed. It is too costly to compel a rope to adjust itself to a sheave or drum, then later change the sheave groove or drum surface. The time to make the correction is before reeving the rope. If such a repair becomes a necessity, the rope should either be cut back or the ends changed at the time of the repair.

When a rope shows wear at the point of stress or heaviest use, it should be cut back or the ends changed. Frequently the worn end can be placed on the drum and be as safe for ordinary work as a new cable.

Break Them In Gently

All new ropes, or ropes brought from the warehouse, should be given a run-through period before they are required to deliver steady work. This gives the new cable a chance to "learn" the machine, as each piece of equipment has its own peculiarities. Then often there are minor corrections needed which cannot be detected by an inspection. All ropes must adjust themselves to these, even preformed rope which is said to be "pre-broken-in".

In training a new operator, the green hand is required to work with an experienced man until he learns the "feel" of the machine and understands its peculiarities. Learning to take the right bite is more important as a rope-life factor than most operators realize. A good cable can be injured very easily by a green operator.

For draglines and similar equipment, we use only preformed cable. Preformed spools better, does not kink so readily, and there is less loss from cutting back. Most operators are better satisfied with preformed and, therefore, do better work themselves.

In ordering new rope, follow the manufacturer's specifications as to grade, size, and type of construction. This is important. The machine was originally planned for a certain cable.

(*Concluded on next page*)



All sheaves and cables should be checked frequently; it pays big dividends.



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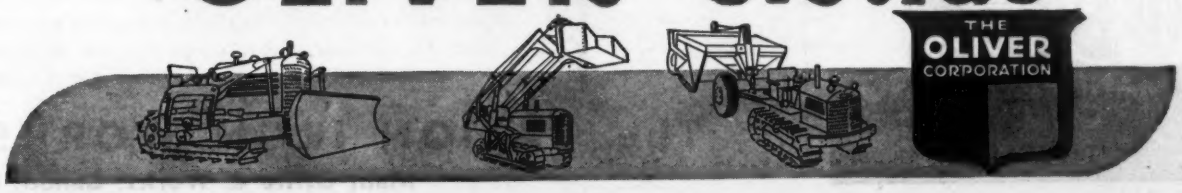
● Hard or muddy ground... turns or straightaway ... downhill or up, Oliver "Cletrac" crawler tractors never lose their sure-footed grip on the ground. For only Oliver "Cletracs" have *controlled differential steering* ... the patented principle that keeps power on both tracks at all times.

You simply slow down one track and speed up the other to get a short, sharp turn. This feature alone assures greater safety on hills and slopes, for there is always traction on both tracks. They steer the same going downhill with a load as up. There is no need for the operator to cross-over on the controls as is necessary on the ordinary tractor.

Oliver "Cletrac" tractors are designed for tough, hard service. Lubrication and maintenance are simple, for these tractors are unusually accessible. They are ruggedly built to resist the twists and strains of tractor service.

Substantial numbers of Oliver "Cletracs" are now being released for essential service. Your Oliver "Cletrac" dealer will gladly assist you in making application for a new tractor. **The OLIVER Corporation,** Industrial Division, 19300 Euclid Avenue, Cleveland, Ohio.

OLIVER - Cletrac



Getting Longer Life From Dragline Cables

(*Continued from preceding page*)

No operator or mechanic should be allowed to use a cable size different from that recommended.

Inspection and Care

We inspect our equipment on the job daily and give it a thorough inspection each week during the day lay-up. These inspections include the cables, which are checked for broken wires and signs of unusual wear or abrasion.

The cables are lubricated as often as recommended by the rope manufacturer. We have found that it is cheaper and better for the rope and the machine to use only factory-recommended lubricants. We do not always follow the lubrication methods recommended because much of this work is done on the job and the necessary equipment is not available, but efficient lubrication continues just the same.

In storing our ropes, regardless of whether they are new or retired, we follow an established rule. The rope must be cleaned and inspected, the findings noted on a card which is attached to the coil or the reel, and the rope is treated with an acid-resisting storage dressing. This type of sealing lubricant can be obtained from any company which makes a specialty of wire-rope lubricants.

By following these rules, we find that we get better satisfaction from our machine operators as well as from the cable. We find that each rule outlined is important in promoting safe machine operation, in giving us longer life for equipment with fewer lay-ups, and doubles the average rope life which we thought satisfactory five or six years ago. For us, extra attention to our cables has paid big dividends.

New Blaw-Knox Dealers

The C. H. Jones Equipment Co., 236 W. South Temple St., Salt Lake City, Utah, has been appointed by the Blaw-Knox Co., Pittsburgh, Pa., to distribute its road equipment and buckets in that area. The Acme Wire & Iron Works, 1343 W. Laurel St., San Antonio, Texas, has been named as Blaw-Knox distributor in the San Antonio territory.



Sketch of a 200-foot-span timber arch bridge, details of the design of which are available from the West Coast Lumbermen's Association.

Timber Bridge Has New Design Features

The standardized design for a 200-foot-span timber arch bridge, prepared by T. K. May, Design Engineer for the West Coast Lumbermen's Association, is described and illustrated in a new booklet which should be of particular interest to county highway engineers confronted with the necessity of rebuilding bridges in the post-war period. This structure is also applicable to many sites on secondary roads of state highway systems throughout the country.

Among the distinctive features of the bridge design is an arch chord with metal splices for the weight of the arch only, with spaces between members filled with concrete after erection to make a continuous compression member for the superimposed load. Other features include Mesnager concrete hinges applied to a timber arch; a simple crown hinge; glued laminated floor beams to eliminate shrinkage; a composite wood-concrete deck serving also as a horizontal beam transmitting lateral loads to the end pylons; reinforced-concrete sidewalk cantilevered from the composite wood-concrete deck; dog-leg cantilevered reinforced-concrete posts to take the lateral thrust from the wood rail, transmitting the thrust to the posts; and lighting placed below the rail to illuminate the sidewalk and deck.

Free copies of the booklet containing further details on this 200-foot-span timber arch bridge may be secured by interested state, county, and township highway engineers direct from the West Coast Lumbermen's Assn., 364 Stuart Bldg., Seattle 1, Wash. Write on your official stationery and mention this item.

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30 years of manufacturing blades has developed for you a special steel, milled through our own rolls and forged at the edges to give that extra wearing quality you need.

All widths lengths, and thicknesses, punched ready to fit your machine.

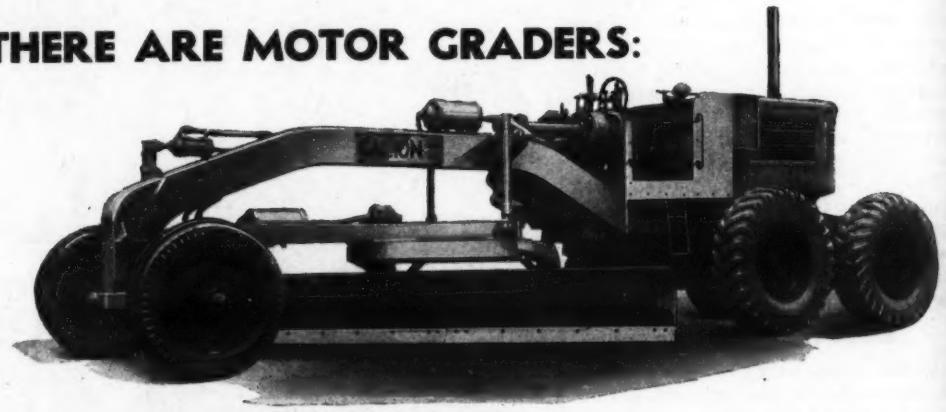
Consult your internationally recognized Blade Specialists. Write for special bulletins, giving type and name of machines you operate—get set for Blades early.

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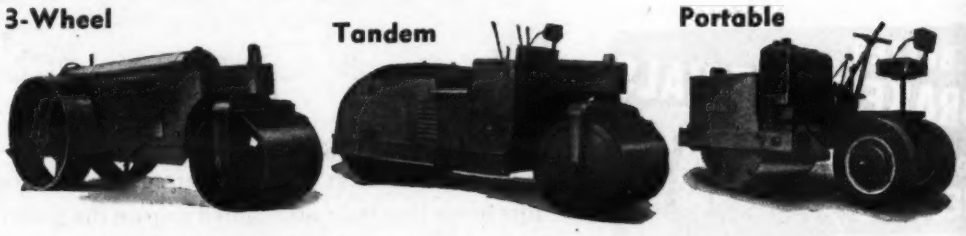
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3-wheel, tandem and portable—in a type and size to meet the exacting requirements for precise compaction. These up-to-date rollers do so much for so little.

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Lay that material down, brother—lay it down with a Galion spreader. Even width and depth and all classes of road material. Investigate Galion spreaders if you want to lay it down right.



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Almost sixty reliable distributors in this country—and they are located in strategic sections for your convenience in getting Galion road machinery. Become acquainted with the one nearest to you . . . find out all about Galion and what it can do for you in road and airport construction. Do it today.

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Consultants Organize For Post-War Planning

Robert W. Briggs Associates, consulting engineers and architects, with offices at 103 Park Avenue, New York City, has recently been formed to engage in the planning and development of all types of post-war public works projects. Its membership brings together very broad experience and training to provide full engineering and architectural service, from the inception and preparation of plans to full supervision of construction.

Included on the staff are Robert W. Briggs, consulting engineer in the heavy-construction field, as General Manager and Chief Engineer; Arthur W. Hayden, well known New York consulting engineer and leading authority on rigid-frame and continuous structures, who will serve as Designing Engineer; William J. Krefeld, Director of Civil Engineering Research Laboratories at Columbia University and consulting engineer on testing and development of engineering and architectural materials, as Engineer of Materials and Development; Donald M. Burmister, soils and foundations consultant to the U. S. Navy and War Departments on nearly a hundred projects, who will be Engineer of Foundations and Soils Tests; and Nicholas V. Feodoroff, specialist in hydraulics and water supply, as Associate Engineer, Hydraulics.

George E. Strehan, M., Am. Soc. C. E., and Registered Architect, with thirty-six years' experience in the design and construction of all types of buildings, will serve as Building Engineer. Other well known authorities in the architectural field complete the roster.

New Bulldozer Catalog

The line of Baker cable-controlled bulldozers and gradedozers, featuring easy operation, low maintenance, and adaptability to field conditions, is described in a new 16-page catalog. Incorporating self-energizing air-conditioned cone-type clutches and brakes for cooler, smoother operation, and readily accessible brake and clutch adjustments, these Baker units are described as ruggedly built and designed for quick, simple assembly on Allis-Chalmers HD-10, HD-10W and HD-14 crawler tractors. The catalog is profusely illustrated, gives detailed construction and operating data, and contains complete specifications.

Highway engineers and contractors may secure copies of Catalog 849 by writing direct to the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill., and mentioning this review.



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ROCK AND GRAVEL CRUSHERS
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TRACTOR-CRUSH... PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa

Large State Program For Secondary Roads

A $60,000,000 post-war construction and maintenance program for 7,205 miles of farm-to-market roads, without requiring the counties to furnish any of the funds, has been announced by the Texas Highway Department. Half of the money for this work will come from the current operating income of the Highway Department, to be matched by Federal funds, and the program is set up for the first three years following the end of the war.

Approval of the plan to aid the state's agricultural interests means that the State will surface and maintain 5,830 miles of farm roads on which the counties are at present paying the upkeep. Also, the new program includes an additional 1,375 miles of surfaced farm roads which the State previously constructed and now maintains.

The Texas Highway Commission believes that by transferring this burden from the county governments to the State, the counties will be able to concentrate their local funds on the roads remaining under county control and thus make tremendous strides in improving other farm roads. Although the proposed program includes only a relatively small portion of the total farm-to-market roads in Texas, the plan is the maximum for which the State could obligate itself for three years immediately after the war, on the basis of estimated receipts.

The selection of the 7,205 miles was made after detailed study and research of the entire 170,000 miles of county roads in the state, and will benefit the most dense agricultural areas.

Tunnel-Lining Data In One Bound Book

Tunnels are driven and lined with concrete for a great variety of purposes and with different specified degrees of refinement. Properly filling a tunnel arch is in the nature of being an art. Regardless of the type of lining equipment employed and concreting procedure followed, many variables are encountered with different structural designs and working conditions. The "cream-of-the-crop" articles on tunnel lining with concrete have been gathered in a 100-page book, complete with all of the diagrams and illustrations pertinent to the subject which appeared in the original articles.

The long range and flexibility of the Rex Pumpcrete system make it readily adaptable to a wide variety of concrete-placing requirements in general tunnel construction. As a means of furthering the understanding of efficient Pumpcrete usage in one of its most important fields of application, tunnel lining, the Construction Machinery Division, Chain Belt Co., 1666 W. Bruce St., Milwaukee 4, Wis., has prepared this book "Tunnel Lining With the Rex Pumpcrete" as a worthwhile reference volume for tunnel contractors and engineers. The various methods and procedures described are largely the developments by active tunnel-construction organizations which have been accepted as sound practice for the conditions given in each instance.

Copies of this bound volume may be secured by engineers and contractors engaged in tunnel construction by writing to the manufacturer on their business letterhead, requesting a copy of the book and mentioning this review.

ROSCO MINNEAPOLIS

DEPENDABLE ROAD MACHINERY

MAINTAINER



The trailer-type Rosco Maintainer will handle any kind of bituminous material. This one machine will load, circulate or transfer. It's equipped with heating flues and burners, and can be used for hand or short bar spraying. Ordered in fleets by highway departments of many states. Can be truck mounted. Available in several sizes.

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Speed of towing does not affect the operation of this power-driven brush. It has a two-way turn table broom support and roomy operator's platform with levers and controls within easy reach. Four pneumatic rubber tires . . . tow-pole hitch . . . welded, heavy duty steel construction . . . standard seven foot width.

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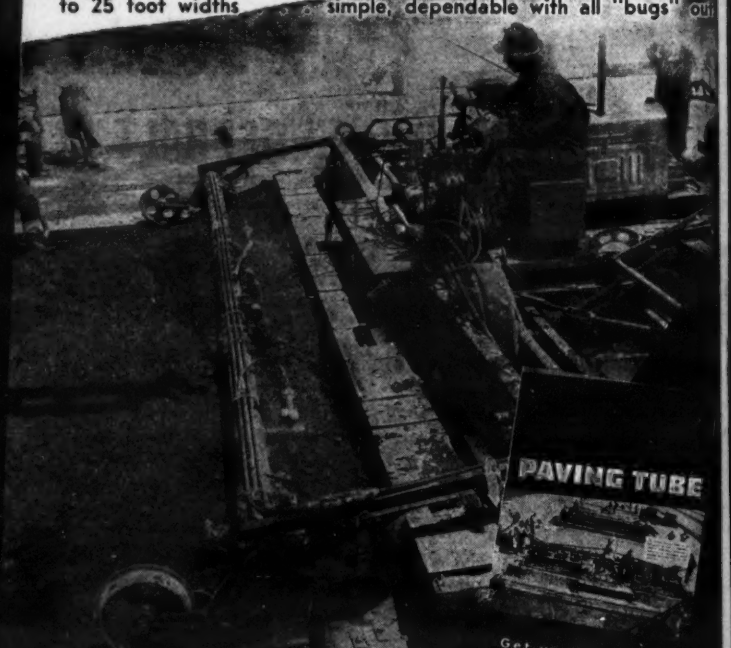
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The modern JACKSON Vibratory Paving Tube is the only full-width internal vibrator for highway and airport paving, backed by many years satisfactory use under widely varying conditions. Proved performance certifies to the contractor and engineer that they will get desired results in efficient and economical operation, placement, density, strength and wearing surface of the finished slab. This holds true for the usual mixes designed for vibratory placement and those made with air entraining cements.

The JACKSON Tube is super-powerful, with plenty of reserve beyond the toughest jobs encountered . . . is easily attached to any modern conventional finishing machine . . . available in 10 to 25 foot widths . . . simple, dependable with all "bugs" out



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Standard, full-width, dual vibratory tubes submerged horizontally in concrete have proved most efficient through years of exhaustive tests and extensive use. Powerful high-frequency vibratory impulses are transmitted in force through the thickest slab, quickly transforming the stiffest mixes into uniformly workable condition. If desired, other types of vibratory elements can be easily substituted with the same basic frame and carriage.

The reserve capacity of the power plant can be used to run hand operated vibrators in conjunction with the tube. The power plant also generates power for electric tools and lights used on night clean-up or emergency operations.

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JACKSON VIBRATORS, Inc.
by ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

Jap Peace Term for the U. S.

"All naval air bases and air installations to be destroyed, except those needed by Japan."

★ ★ ★

ARE YOU BUYING YOUR SHARE OF BONDS?

County Maintains All Roads in Area

(*Continued from page* 1)

of the state system is paved with concrete except 8 miles of bituminous surfacing. The county trunks include 45 miles of concrete and 80 miles of bituminous mat, while the remainder of the roads are surfaced for all-weather service with gravel or crushed rock.

Organization and Finances

Brown County is governed by a board of forty-nine men, one member from each town or village and each ward of the cities, elected for a two-year term. Five of these forty-nine men are appointed to the Highway Committee while the executive officer of the County Highway Department is the Highway Commissioner, elected by the County Board of Supervisors for a term of two years. N. P. Hayes, whose seventeen years of service with the State Highway Commission of Wisconsin qualify him for the duties of County Commissioner, has held that position for the past four years.

The annual income for county highway operations consists of a primary allotment of $65 per mile from the state gasoline-tax receipts for each mile of county trunk highways, plus a part of the $3,000,000 state fund allotted to counties on a mileage and car-registration basis. In allotting this fund, 60 per cent is proportioned according to the ratio which the county's road mileage bears to the total mileage of highways in the state, and 40 per cent on the basis of cars registered from the county. This system is quite beneficial to the sparsely populated counties but is sometimes felt to be unfair to the counties in which large cities greatly increase the car registration without a corresponding increase in the mileage of highways.

These two items of income ordinarily afford Brown County slightly over $86.-000. Additional funds can be secured if necessary from a property tax assessed by the County Board of Supervisors. Early road construction was financed in this manner. A $2,500,000 bond issue by Brown County in 1920 was to be so retired, but in 1925 the State Legislature assumed payment of these bonds from the state's 2-cent gasoline tax, increased to 4 cents in 1931, and since that time there has been little need for a property tax to finance county highway work.

All maintenance work on the state highway system is performed by county forces and paid for on the predetermined rental basis for men and machines. Township roads are likewise maintained by county forces and equipment, and the work is paid for by the townships at rental rates identical with those charged the State Highway Commission for work on the state system. Township maintenance alone often amounts to $50,000, although the amount fluctuates greatly from year to year, while the state's requirements remain fairly constant.

To encourage construction of new township roads, Brown County matches any funds made available by the townships on a 50-50 basis; in 1944 this item alone was $80,000.

Road Maintenance

Maintenance of the state system, performed by county forces, is a continuous operation, winter and summer. Eight truck patrol sections have been established for the state system while four more handle the surfaced portions of the county trunk highways, performing all routine maintenance during the open season as well as wintertime snow plowing and sanding.

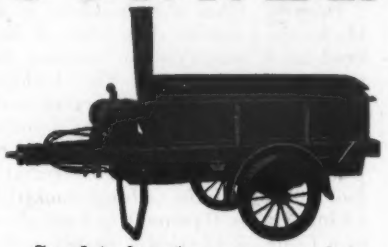
The unsurfaced portions are maintained by thirteen patrolmen with motor graders and crews, varied in size as the requirements of current operations demand. They shape the surface, mow the roadsides, clean out drainage structures, and remove snow and ice on their sections, each of which averages 70 miles of road. For periodic strengthening of the unsurfaced roads, Brown County has the usual Wisconsin gravel readily available only in its eastern third while the western section depends on crushed limestone.

Some reconstruction of light bituminous mats is necessary each spring to repair winter damage, and an additional mileage is usually surfaced as a betterment program. The County has available for this work several additional motor graders; a Littleford distributor of 1,200-gallon capacity; a Galion 8-ton tandem roller; three tank-car heaters, a Bros, a Clarkson, and a Cleaver-Brooks; and a Barber-Greene traveling mixer.

In new locations the County does its own grading with six Caterpillar and Allis-Chalmers tractors, two Caterpillar power graders, a Caterpillar elevating

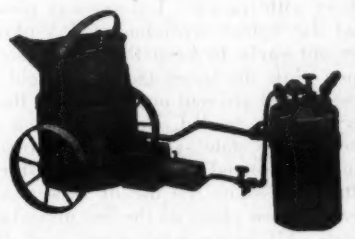
(*Continued on next page*)

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Speed up work by using a Connery Heating Kettle for building and maintaining highways, airports, barracks and roads. Made in sizes of 30, 80, 110 and 165 gallons.

Send today for our complete catalog showing our full line of Tar and Asphalt Heating Kettles, Spraying Attachments, Pouring Pots, etc.



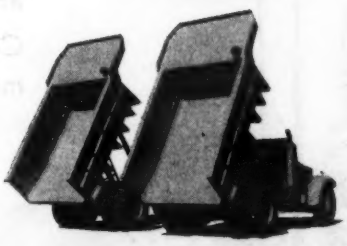
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PLENTY TOUGH!





MARION BODIES

"HAUL IT AND HAVE IT"

Yes, they can haul up to 20 tons of rock, for they have that specially-engineered construction that makes them ask for more where others would ask for mercy.

The bodies pictured are made with ¼" steel shell and 2" oak floor under a ⅜" wear plate. They have twin telescopic straddle mount hoists.

Marion offers a full line of dump bodies and hoists. If you require truck bodies of special design, MARION engineers will do your job effectively and economically.

See Your Local Distributor or Write
THE
MARION METAL PRODUCTS CO.
BODY and HOIST DIVISION, MARION, O.

County Maintains All Roads in Area

(*Continued from preceding page*)

grader and two 7-cubic-yard scrapers.

Winter Work

For snow plowing, Brown County uses 18 V-plows mounted on FWD, Autocar, International, Oshkosh, and Walter trucks of 5, 7, and 10-ton capacity; 5 V-plows on motor graders; and 6 V-plows with tractors. Ten one-way plows and the lighter truck-mounted V-plows get out early to keep the state system open while the larger trucks are held in reserve and are sent out only when their services are needed. Delays incident to keeping the state system open throughout a prolonged and severe snowstorm often necessitate the use of slower and heavier snow plows on the less important roads. All heavy truck units used for snow plowing are equipped with two-way radio sets and the county-operated radio station maintains constant contact with all units during a storm.

No attempt is made to sand the entire road mileage of the county, but heavy grades, sharp curves, intersections, and approaches to railroad crossings are sanded by fifteen spreaders of various types. The trucks are loaded by hand from stockpiles established earlier at strategic points, where sand mixed with 50 to 75 pounds of calcium chloride per cubic yard is available.

County Shops

At Duck Creek, about 5 miles northwest of Green Bay, is located the principal county shop and storage yard. A tract of about 20 acres, the yard is fenced and surfaced with gravel and some bituminous mat to provide all facilities necessary for storage and upkeep of equipment. Near the center of the area is a twin building of concrete-block construction, the south end of which is 60 x 200 feet in size, and houses offices, the sign shop, and a large stock room for parts and supplies. Adjoining it, and heated by the same central heating plant, is an 80 x 100-foot building, its roof supported by laminated-wood arch ribs to provide clear floor space for the storage of snow plows, trucks, and other equipment which it is desired to keep warm and available for immediate service regardless of outside temperatures.

Behind this building, outside storage is provided for concrete pipe and other material which exposure to weather will not damage. This area is served by a gas-engine-powered wooden stiffleg derrick with a 40-foot boom for handling heavy items. East of this area is a smaller unheated storage building and somewhat south of it is another brick building 40 x 70 feet in size for the storage and dispensing of lubricants.

Still further south and to the east of the main building are three elevated storage tanks, each of 12,000-gallon capacity, one for diesel fuel and two for gasoline. A pump house is provided for the transfer of fuel to these tanks from a four-car railroad siding located in an old railroad quarry 500 feet away but 50 feet lower in elevation.

Southwest of the main building a group of three smaller brick buildings provide housing for the repair shop, blacksmith shop, and additional storage. At the front door of the repair shop is located the wash rack with a Kerrick Kleaner available for pressure-cleaning of equipment. Overhead doors give access through two sides of the repair shop, and a stationary crane of 8-inch I-beams, having a 15-foot-radius full-circle swing and a 7-ton chain hoist traveling on the horizontal boom, is available for handling heavy assemblies. In the northwest corner of this building a 20 x 20 x 16-foot metal cabinet lighted by ten covered electric lights and ventilated by a 6-cfm exhaust fan is used for spray painting.

Opening from this building is the blacksmith-machine shop with an overhead track spanning the entrance and running lengthwise of the building. Heavy parts handled by the crane in the repair shop can be moved by a rolling chain hoist on this track to a 60-ton Manley hydraulic press, a Universal 7-foot x 24-inch lathe, a forge flanked by a Little Giant 50-pound trip hammer, or to a Gould & Eberhardt shaper with a 24-inch stroke. Work benches with built-in drawers and cabinets extend under the windows along the sides of the shop. Other tools in this building include a pedestal grinder, a Milwaukee drill press, and a power hack saw, all of which, as well as those machines previously mentioned, are driven by individual electric motors. A Smith acetylene generator, with racks for oxygen tanks, furnishes gas for Airco and Victor torches used for oxy-acetylene welding

(*Concluded on next page*)

Each Dipper Tooth made *GOOD AS NEW* in only 30 Seconds!



Shovel digger teeth wear rapidly. Particularly in rocky soil and gravel where they are subjected to excessive abrasion, shock and impact.

To make the teeth of buckets more wear-resistant, to keep them sharp longer and avoid frequent replacements, many companies are relying exclusively on Coast Metals Hard-Facing. Applied to the teeth, as well as lips, runners and other parts, it successfully protects these vulnerable points so that the bucket functions more effectively, more quickly, and at a significant saving in power. After the teeth become slightly worn, they are then given another Coast Metals Hard-Facing and once again made good as new . . . in only 30 seconds!

Coast Metals Hard-Facing meets today's needs for making all machinery, equipment exposed to severe wear last longer. Easily applied by the electric arc or gas torch to any ferrous metal including manganese steel, alloy steel, cast iron and chilled iron. New revised edition of Form X-201 goes into full detail. Write for your copy today.

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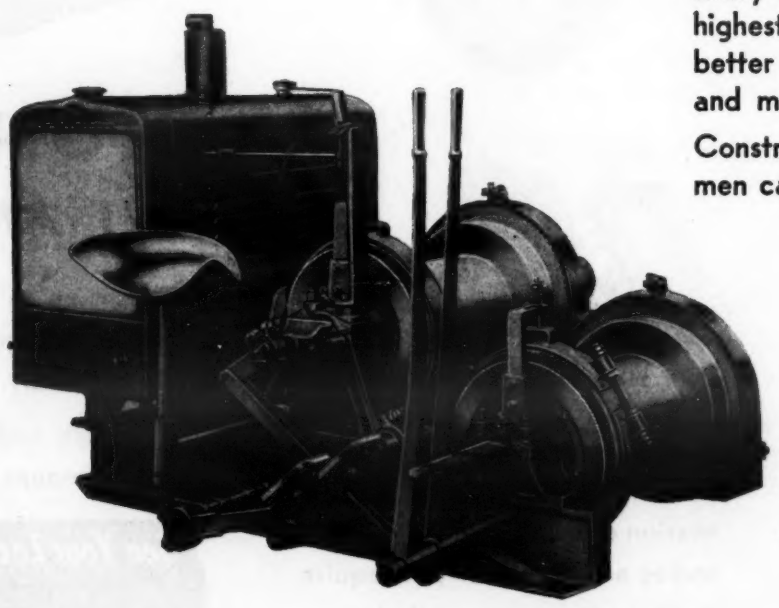
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hard-facing weld rods
MAKE YOUR EQUIPMENT LAST LONGER

Clyde on your hoist means

SATISFACTION ON YOUR JOB!

This name plate on your hoist is your guarantee of dependable service.





Every Clyde hoist is engineered to the highest efficiency standards to assure better performance, greater economy and more profit to users.

Construction and material handling men cannot take a chance on inferior or questionable equipment. To make sure of steady, trouble-free service . . . to maintain production schedules . . . use equipment that is universally acknowledged as leaders in its particular field.

Write for special bulletins that give full details on any type of Clyde Equipment.

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CLYDE

CLYDE IRON WORKS, INC.
DULUTH, 1 MINNESOTA

County Maintains All Roads in Area

(*Continued from preceding page*)

and cutting, while a portable arc welder is available for electric welding.

An interesting shop-built tool is a metal shear made with a semi-circular blade to permit cutting along curved lines and so geared that a 3-foot handle furnishes sufficient leverage to cut 3/16-inch plate.

Personnel employed at the Brown County shop includes a stock clerk, timekeeper and assistant, and a shop foreman with two helpers to maintain the building and grounds, while a chief mechanic aided by eight men (automotive mechanics, machinists, welders, painters, and laborers), attends to the upkeep of equipment. Two watchmen and a night greaser complete the group.

Post-War Plans

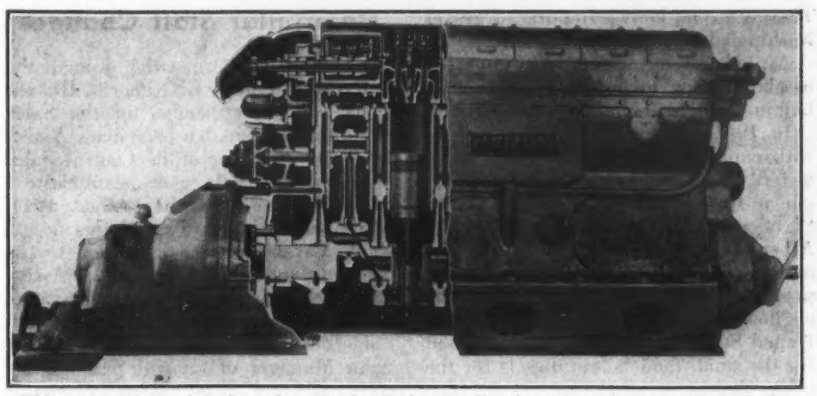
In 1941, a $2,000,000 program of concrete paving, including belt roads around DePere and Green Bay, was authorized. Under this program $225,000 of bonds under the original $600,000 authorized issue were sold and $100,000 expended before the war interfered. The unexpended balance, plus the remainder of the authorized issue, will be available for immediate post-war construction which, in addition to the proposed paving, will include the construction of two more shops in the eastern part of the county to furnish better distribution of facilities for storage and repair than is now afforded by the large central shop and its single auxiliary located at Greenleaf, 15 miles south of Green Bay.

Personnel

All the county maintenance forces are unionized, and receive good wages and stable employment, so Brown County has suffered less from loss of trained personnel during the war than some other government organizations.

The Highway Department of Brown County, Wis., is under the direct management of N. P. Hayes, County Highway Commissioner. Ray Nadeau is Patrol Superintendent; Francis Brunette, Assistant Patrol Superintendent; Matt Dufeck, Shop Foreman; and Stanley Queoff, Chief Mechanic.

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CONTINENTAL
RUBBER WORKS
ERIE, PENNSYLVANIA, U.S.A.



This view of the interior of a Hendy Series 20 diesel engine gives an idea of the design details.

New Line of Diesels In 190-250-Hp Range

An entirely new series of diesel engines in 6 and 8-cylinder models with a power range from 190 to 250 hp at 900 rpm has been announced by the Joshua Hendy Iron Works, Sunnyvale, Calif., extending its line of diesels from horsepower ratings of 190 to 780 hp. These Series 20 engines are of the four-stroke-cycle type, designed for heavy-duty medium-speed operation. They are air starting and completely enclosed with overhead camshaft, unit fuel pumps and injectors, precision-type bearings, and full pressure lubrication.

The new engines have cast-iron monoblock construction with under-hung crankshaft, removable cylinder liners, and auxiliary drives arranged at either end. They are entirely self-contained, with all main accessories engine-mounted. Among the attached accessories are air compressor, governor, water and lube-oil circulating pumps, fuel-transfer pump, lube and fuel-oil filters, lube-oil cooler, and gage board.

Complete data on the Hendy Series 20 diesels may be secured direct from the manufacturer by mentioning this item.

Stolz of Osgood-General Receives Citation in Italy

Lieut. Col. Myles (Ken) Stolz, formerly sales promotion and advertising manager for the Osgood Co. and General Excavator Co., Marion, Ohio, has been presented with the Bronze Star Medal. Colonel Stolz is executive staff officer in operations at the 15th AAF Headquarters in Italy.

CLEVELAND ROCK DRILLS are PRE-TESTED to insure PEAK PERFORMANCE!



Cleveland Drills being run-in.

Actual tests on the rock.

The testing machine.

WHEN a Cleveland Drill leaves our plant we *KNOW* it will give peak performance in the field. For every Cleveland model receives extensive testing as soon as it is built.

As the first step, every machine undergoes a 4-hour break-in period. Then it is pulled down, carefully examined and re-oiled. Secondly, at regular intervals, machines are taken from the run-in line and are operated in actually drilling rock.

Then, every unit is placed on our testing machine. This machine hydraulically transmits the drill's blows to a diaphragm which in turn registers on a moving tape. Card records of each test are kept, showing (1) The number of blows struck per minute, (2) force of blow in foot-pounds and (3) the rate of air consumption of each drill.

This careful pre-testing, along with their modern design and skillful manufacture, explain why Cleveland Drills perform so well on the job.

LEADERS IN DRILLING EQUIPMENT

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Brazil's Pre-War Imports Of Construction Equipment

Estimates of pre-war imports of rock-crushing equipment into Sao Paulo, Brazil, reported in a recent issue of *Foreign Commerce Weekly*, show that 90 per cent of the heavy jaw crushers, including portable rock-crushing plants, came from the United States. Of the lighter jaw crushers, 50 per cent were from Germany, and the remaining 50 per cent supplied by England and the United States. Roll crushers were received almost entirely from the United States, while vibrating screens came from both Europe and this country. There were no known imports of gravel washing plants.

Asphalt mixing plants were imported in about equal quantities from France, Belgium, England, and the United States.

In 1941, production of jaw crushers with capacities of from 1 to 20 cubic meters (1.3 to 26 cubic yards) was begun in three small plants in Sao Paulo. Practically all of the units are portable. All-steel jaws are made by only one manufacturer, jaws of semi-steel being produced by the other two plants. The engines are imported, chiefly from the United States, gasoline units being used for the small models and diesels for the larger ones.

Caterpillar Staff Changes

F. D. Haberkorn, who joined the Caterpillar Tractor Co., Peoria, Ill., ten years ago as a member of the Sales Training Division, has been made Assistant Sales Manager of its Central Sales Division. He has been Assistant Eastern Sales Manager since September, 1944. After serving abroad with the Army, C. A. Barabe, Jr., has returned to the company and will fill the post of Assistant Sales Manager of the Eastern Sales Division.

F. E. Rusher has resigned as Assistant Sales Manager of Central Sales to become General Sales Manager and a director of the Peoria Tractor & Equipment Co., Caterpillar distributor in the Peoria area.

Rock Drilling Tools And Paving Breakers

The complete line of Bicknell digging chisels, moil points, chisel bits, asphalt cutters, frost wedges, chisels, solid drill steel, clay spades, dirt tampers, sheeting drivers, and detachable-bit drill rods for use with pneumatic equipment is described and illustrated in Bulletin 5223 issued by Bicknell Mfg. Co., Rockland, Maine. Copies will be sent to readers who write direct to the manufacturer.





U. S. Army Signal Corps Photo

The U. S. Engineer Forestry Corps clears out trees to build a logging road in Burma—one of the many jobs being done by Caterpillar D7 tractors and LaPlant-Choate bulldozers for Allied fighting forces all over the world.

Calif. Looking Ahead In R/W Acquisition

After several years of careful study and consideration, the officials of the California Division of Highways have come to the conclusion that only one way remains to protect the huge past and anticipated future investment of the motoring public in its state highway system, for which it pays the entire cost. In the future, on all important state highway arteries, the acquisition of right-of-way will be for present and future full freeway construction where the heaviest volume of traffic is encountered, tapering off to limited freeways, which, in reality, is the acquisition of access rights from the abutting-property owners on a limited basis.

In the succeeding statements the terms "full freeway" and "limited freeway" are used. A "full freeway" is one on which all access rights are acquired. Usually a full freeway is located in urban areas where a maximum of congestion, conflicting movements, and hazard are encountered. Such a highway, in addition to securing all access rights, is usually developed as a divided road with no opening in the median strip, thus preventing left turns, with grade separations at intersecting streets, and with prohibition against pedestrian traffic.

A "limited freeway" is one on which only limited access rights are acquired from the abutting properties.

This is an important feature of the present $100,000,000 post-war construction program in California, which will undoubtedly be enlarged very materially because of a possible increase in the state gas tax by legislative action for the purpose of stepping up the tempo of needed freeway improvement on the state highway system, according to Frank C. Balfour, Chief, Right-of-Way Agent, California Division of Highways, in his paper prepared for the Twenty-Fourth Annual Proceedings of the Highway Research Board.

To date the California Highway Commission has passed resolutions declaring 420 miles of the state highway system as freeways. Of this total, 264 miles have been declared full freeways, and 156 miles limited freeways, that is, limited-access highways. Of the 124 projects in the present post-war program, 52 are either full freeways or limited freeways. Of the total of 220.9 miles, 99.8 miles represent full freeways and 121.1 miles are limited freeways.

To date, there has been a total of approximately 25 miles of full freeways constructed in California, the most important being the Arroyo Seco Parkway in Los Angeles County. The ultimate plan of the California Division of Highways is to convert the two main north and south state arterial highways, U. S. 99 and 101, and two of the main east and west arteries, U. S. 40 and 60, into freeways for their entire length, with portions of U. S. 50, a third important east and west cross-state route, also being converted into a freeway. This will ultimately make the main highways, where heavy traffic congestion is found, full freeways with the balance of the alignment limited freeways.

Unfortunately, the Supreme Court of the State of California has recently seen fit to decide adversely to the best interest of the Division of Highways in several condemnation cases which reached this tribunal through appeal. As the result, right-of-way acquisition men in the field find extreme resistance on the part of property owners. Owners of residential properties are reluctant to sell due to the almost impossible housing situation; industrial-property owners concerned with manufacturing products in connection with the war effort argue that they are too busy to take time out to consider right-of-way acquisition; and the California farmer is busy collecting the heaviest profits in the history of agriculture.

In spite of these handicaps, since January 1, 1944, Mr. Balfour reports the completion of well over 60 per cent of an initial $10,500,000 right-of-way acquisition program in number of parcels and over 65 per cent in expenditures. The overall program of right-of-way acquisition for present post-war construction plans represents a total expenditure of over $20,000,000 and the acquisition of more than 7,500 parcels of land.

WINPOWER ELECTRIC PLANTS

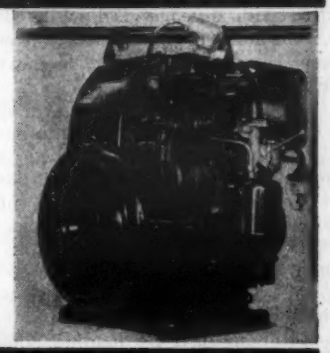
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110-VOLT D.C. MANUAL START

Immediate shipment from emergency stock on many models A.C. and D.C. 350 to 25,000-watt plants. Wire us your requirements.

Light, Safe and Portable
Sturdy and Compact in Construction
Simple in Design and Inexpensive to Operate

These models have extremely high output for their size and weight. They are recommended for portable work on road and construction jobs, repair depts., fire depts.; indispensable for lighting and operating of electric tools such as portable compressors, drills, saws, sanders, etc.

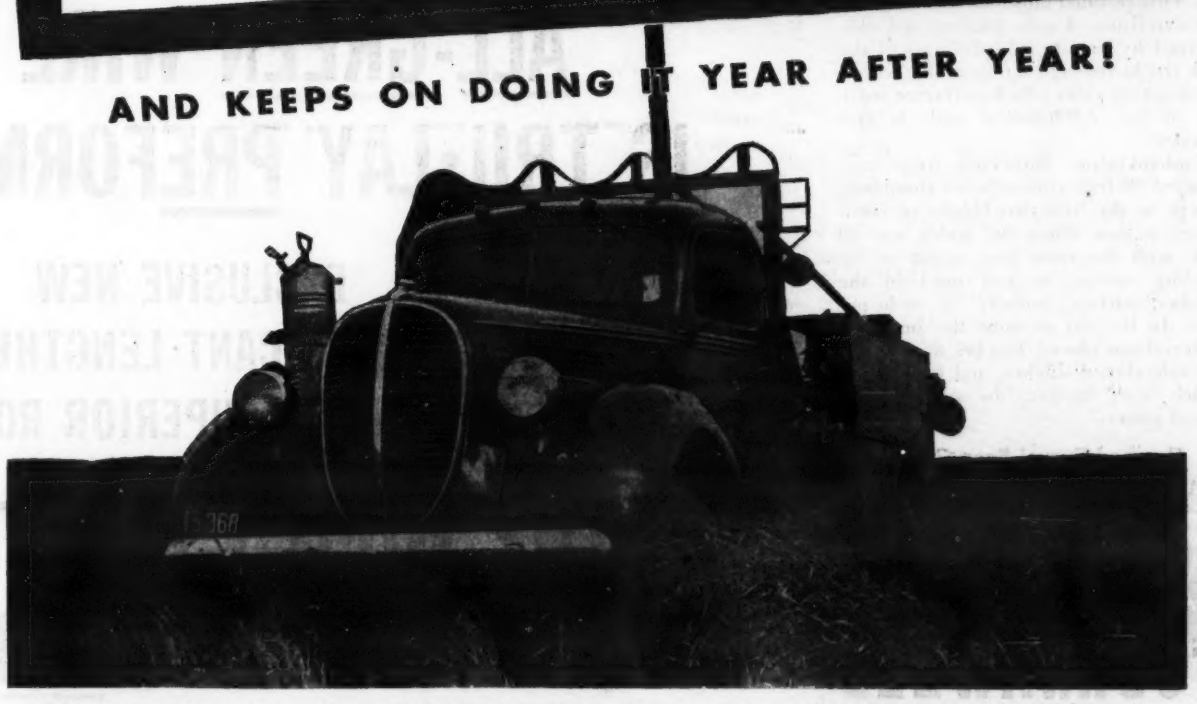
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WINPOWER MFG. CO., NEWTON, IOWA

THE TRUCK THAT *Goes Places* OTHER TRUCKS CAN'T . . .

AND KEEPS ON DOING IT YEAR AFTER YEAR!



The outstanding performance and long life of service of Marmon-Herrington *All-Wheel-Drive* converted Fords—under the most difficult operating conditions, are well worth consideration in planning new truck purchases.

The ability of these trucks to "go places and do things" which are impossible for conventional drive vehicles, is easily understandable. What is not so well appreciated is the comparative ease with which they do work which standard drive trucks have to struggle and strain to accomplish. Thus a Marmon-Herrington *All-Wheel-Drive* will render longer and more economical service, even on jobs where "ordinary" trucks are now being used.

If you need new trucks for public utility, oil-field, logging, road-building, road maintenance or similar services, now is the time to get your order in line for earliest possible delivery.

LET'S FINISH THE JOB . . . BUY MORE BONDS

MARMON-HERRINGTON

All-Wheel-Drive TRUCKS

MARMON-HERRINGTON CO., Inc., INDIANAPOLIS 7, INDIANA

Cable Address: MARTON

Airport Access Road Rushed to Completion

(*Continued from page 6*)

pervious gravel borrow. Cuts were taken out 9 inches below subgrade and backfilled with this material while all embankments were constructed of it in 4½-inch compacted lifts to a maximum height of 3 feet.

Satisfactory material was available in a ridge near one end of the job and two ¾-yard power shovels, a Lorain and a Northwest, were put in different portions of this pit. Both loaded into ten International, Ford, and Chevrolet trucks hauling 3½-cubic-yard loads, and the average production of this equipment on the ¾-mile average haul to the job was in the neighborhood of 2,000 cubic yards per 10-hour day. By loading simultaneously from different parts of the pit and dumping alternate trucks into the windrows, uniformity of material was secured when spreading by a Caterpillar motor grader prior to rolling. The material was utilized as it came from the pit with a slight amount of hand picking of material larger than 6 inches in diameter on the road. Both sheepsfoot and pneumatic rolling were paid for at a bid price per hour.

Watering was paid for by the thousand gallons and the contractor hauled it in 2,300-gallon tank trucks from a 10,000-gallon elevated steel tank which had been erected near one of the city water works reservoirs not far from the job. This elevated tank was filled by two Gorman-Rupp 4-inch pumps and discharged by gravity into the tops of the tank trucks through a 6-inch line with a quick-acting valve which permitted loading of the 2,300-gallon tank in two minutes.

Embankments and cuts were constructed 30 feet wide between shoulders, except in the first two blocks of semi-urban section where the width was 40 feet, with the same crown put in the grading section as was used in the finished surface, namely ¼ inch per foot. In the cut sections the imported material was placed 9 inches thick under the side slopes, ditches, and backslopes, which were later to be surfaced for paved gutters.

Crushed-Gravel Base Course

A 3-inch crushed-gravel base course meeting the following specifications for grading was placed over the full 30-foot width of embankments and in cuts:

Size (Square Opening)	Per Cent Passing
¾-inch	100
½-inch	70-100
No. 4	45-75
No. 10	35-60
No. 200	5-20

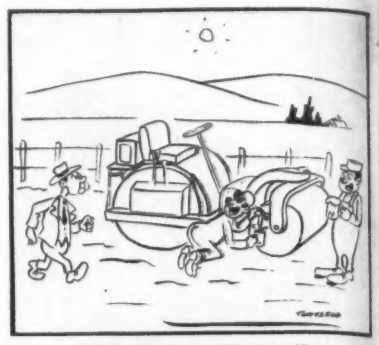
To expedite this work, the contractor secured the material from a pit which had been established by the contractor for the nearby airport. This material was produced by a Pioneer crushing and screening plant and raised by a belt conveyor to a 30-ton steel bin equipped with bottom-dump gates. Under the bin a 30,000-pound-capacity Fairbanks scale was so equipped that when the beam raised, electricity from a car battery flashed a light in the gate operator's eyes. By this arrangement, uniform 6-ton loads were obtained, average tares being set off on the scale beam, and these 6-ton loads were distributed on the road to provide 127 pounds of material per cubic foot of dried and compacted base. The base material was spread by a Caterpillar No. 12 motor grader and wet and rolled, then permitted to dry before priming.

Road-Mix Surface

The priming of the gravel base with MC-1 was done at the rate of 0.40 gallon per square yard by a 1,750-gallon Littleford distributor. Applications were made in 10-foot widths, covering the entire 40 feet of the city section and the 30-foot width on the highway section. In cuts, the prime was extended down the 10:1 front slope, up the 2:1 backslope, and for 1 foot beyond the back of the ditch to provide for the 8-foot-wide surfaced gutters. This prime coat was permitted to cure until all tackiness had disappeared, which was usually within 48 hours.

Mineral aggregate for the 1½-inch bituminous surfacing met the following specifications:

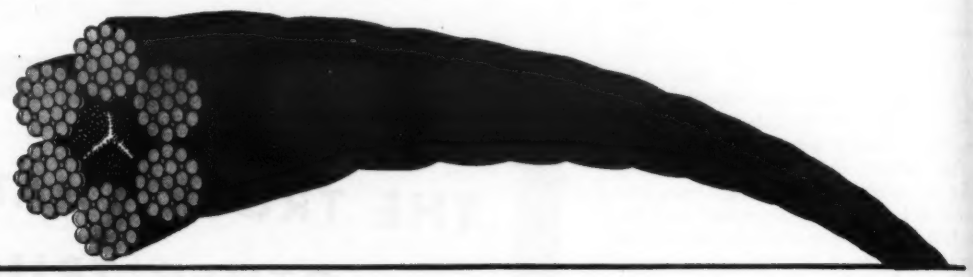
Size (Square Opening)	Per Cent Passing
¾-inch	100
½-inch	70-100
No. 4	45-75
No. 10	35-60
No. 200	5-10



"We filled it with beer!"

This aggregate was produced by the crushing and screening plant which produced the gravel base course. Hauled to the job by the same equipment used for hauling the base material, it was spread down one side of the road in a windrow containing 3 cubic feet per linear foot for the 24-foot-wide mat of the highway section and a proportionately heavier windrow where greater width required.

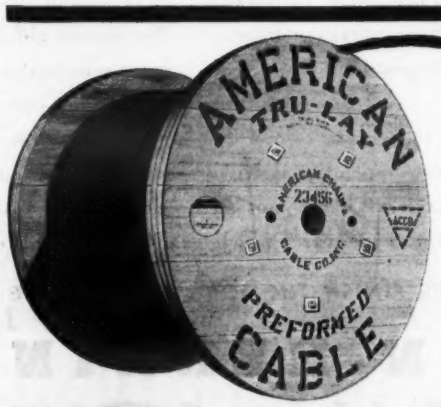
(*Concluded on next page*)



ALL-GREEN WIRE ROPE
IS TRU·LAY PREFORMED I.P.S.*

EXCLUSIVE NEW
GREEN LUBRICANT LENGTHENS LIFE
OF THIS SUPERIOR ROPE

THE WORLD'S BEST ROPE
MADE STILL BETTER



● Hundreds of field tests, confirmed by scores of laboratory tests, prove this new green lubricant has greater adherence with the result that the wires it covers wear longer, give increased service. So now, every strand of TRU·LAY Preformed made of Improved Plow Steel* is literally "stuffed" with this superior lubricant.

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In Business for Your Safety



use time-saving
TOURNAWELD
ROD

Tailored to construction equipment needs, Tournaweld is a specialized premium-type rod that saves you money because it is easier and faster to apply, fits field repair conditions, stands up under tough dirtmoving usage.

77 (light yellow) all position general purpose, AC or DC

88 (black) for downhand, horizontal or flat fillets, etc., AC or DC

78 (light red) special for high tensile strength, AC or DC

HF (black) for hard surfacing, toughens under abrasion, DC

RW (black) special for track rollers, rails and similar hard-wear service, DC

Try TOURNAWELD for faster application, longer life



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LeTourneau Distributor
R. G. LeTOURNEAU, INC.
Peoria 5, Ill. Stockton, Calif.

Airport Access Road Rushed to Completion

(*Continued from preceding page*)

By aeration with Caterpillar motor graders, the moisture content was reduced below 1½ per cent, after which about one-sixth of the windrow was spread out 10 feet wide, also along one side of the road to facilitate the passage of traffic. To this, approximately one-sixth of the total asphalt content was applied. Shots were made in lengths of approximately ¾ mile, or one-half the length of the job, after which a second one-sixth portion of the windrow was bladed across the flat windrow and received a second application of asphalt. The third, fourth, fifth, and sixth applications were made in a similar manner, after which the entire windrow was thoroughly blade-mixed. When night interrupted the mixing operations, the material was placed in a compact windrow at the edge of the road, and mixing and curing operations resumed the following morning, usually continuing over several days.

Final spreading was done by whatever system was most familiar to the blade man doing this work, the required objective being to attain a straight crown of ¼ inch per foot from the center line to the edge of the surfaced section. Since this crown had been placed in the grading and the gravel base course, its formation in the surfacing resulted in a uniform thickness of approximately 1½ inches.

Material for the paved gutters was mixed and cured on a nearby flat area similarly to the roadway mat and later hauled to the gutters, dumped in a windrow, and placed and shaped by Caterpillar motor graders. Rolling of the road surface and the 10:1 front slope of the paved gutters was performed by a Buffalo-Springfield 10-ton tandem roller, while the backslopes were hand-tamped.

The seal coat, consisting of 0.33 gallon of RC-3 per square yard with 20 pounds of chips, was placed this spring. The specified grading of chips was as follows:

Size (Square Opening)	Per Cent Passing
⅝-inch	100
½-inch	95-100
No. 4	0-10
No. 10	0-5

Major Quantities

The major quantities involved in this access-road contract included the following items:

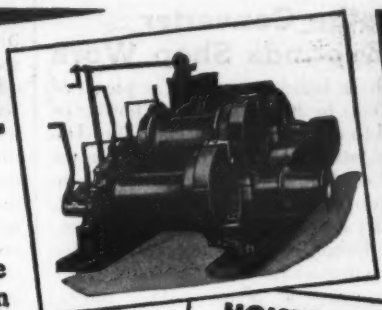
Excavation	26,700 cu. yds.
Cubic-yard-mile haul	13,800 cu. yds./mi.
Watering, embankment	220 M-gals.
Sheepsfoot-roller operation, embankment	80 hrs.
Pneumatic-tire roller operation, embankment	70 hrs.
Mechanical tamping	300 hrs.
Structural excavation	350 cu. yds.
Excavation for pipe culverts	280 cu. yds.
Sewer excavation, unclassified	500 cu. yds.
Special backfill	330 cu. yds.
Crushed-gravel base course, ¾-inch maximum	4,400 tons
Watering base	110 M-gals.
Roller operation, base	60 hrs.
Base treatment, MC-1	51 tons
Crushed-gravel base course, ¾-inch maximum	1,850 tons
MC-3 asphalt distribution	100 tons
Processing roadway	25,500 sq. yds.
Seal coat, RC-3	44 tons
Stone chips	250 tons
Shaping and tamping oil-treated double gutter	1,850 lin. ft.
Class A concrete	202 cu. yds.
Reinforcing steel	10,500 lbs.
8-inch vitrified-clay sewers	945 lin. ft.
15-inch standard reinforced-concrete pipe	560 lin. ft.
18-inch standard reinforced-concrete pipe	496 lin. ft.
Removing and resetting right-of-way fence	450 lin. ft.
Fence posts	25
End panels	6
Brace panels	5
Re-laying pipe	78 lin. ft.
Drop inlets	5
Straight curb	80 lin. ft.
5-foot combination curb and gutter	935 lin. ft.
Concrete double gutter	145 sq. yds.
Concrete sidewalk	485 sq. yds.
Concrete manholes	3
Adjustable manhole	1
Remove and reset garage	Lump sum

Personnel

The contract for the grading and road-mix surfacing of 1.539 miles of access road to the enlarged county airport at Sheridan, Wyo., and the construction of a concrete retaining wall in the residential section was awarded on September 12, 1944, by the Wyoming Highway Department to the Big Horn Construction Co. of Sheridan, Wyo., on its low bid of $49,241.80, with 70 working days allowed for the construction. Under Wyoming specifications, working days are counted starting 20 days after the date on which the contractor receives his notice to proceed. Because of weather conditions, the job was shut down during the winter and completed early this spring. Harvey Johnston was Superintendent for the contractor. For the Wyoming Highway Department, of which J. R. Bromley is Superintendent, the work was under the direction of J. E. Graham, Project Engineer, assisted by Instrument Man Glenn Roberts.

The rebuilding of Rotterdam, The Netherlands, will cost at least $240,000,000, it is estimated. A total of 30,000 houses have been destroyed, along with 1,200 factories and workshops, and 2,300 stores. The area destroyed in May, 1940, amounted to 379 acres.

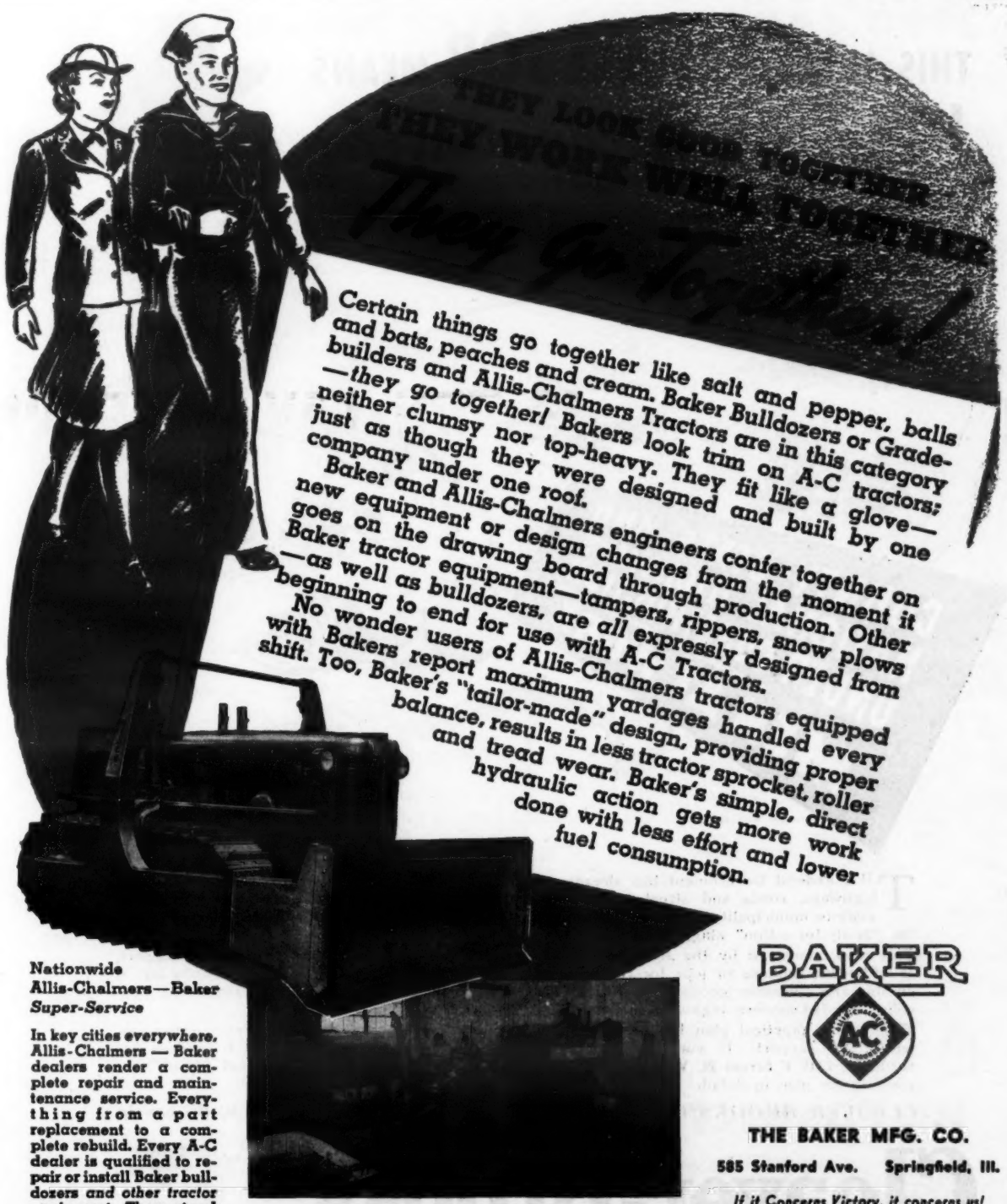
Hoists to Fit the Job



Lidgerwood hoists have earned a 70-year reputation for dependability and efficiency *on the job*. There's a Lidgerwood gasoline, steam, electric or Diesel hoist to fit every construction need. When you need a hoist inquire *first* of LIDGERWOOD.

HOISTS FOR:
CABLEWAYS
INDUSTRIAL PLANTS
CONTRACTORS
MINES—DOCKS
RAILWAYS

LIDGERWOOD
ESTABLISHED 1873
Manufacturing Company
MAIN OFFICE AND WORKS — ELIZABETH, NEW JERSEY



Certain things go together like salt and pepper, balls and bats, peaches and cream. Baker Bulldozers or Grade-builders and Allis-Chalmers Tractors are in this category —*they go together!* Bakers look trim on A-C tractors; neither clumsy nor top-heavy. They fit like a glove—just as though they were designed and built by one company under one roof.

Baker and Allis-Chalmers engineers confer together on new equipment or design changes from the moment it goes on the drawing board through production. Other Baker tractor equipment—tampers, rippers, snow plows —as well as bulldozers, are *all* expressly designed from beginning to end for use with A-C Tractors.

No wonder users of Allis-Chalmers tractors equipped with Bakers report maximum yardages handled every shift. Too, Baker's "tailor-made" design, providing proper balance, results in less tractor sprocket, roller and tread wear. Baker's simple, direct hydraulic action gets more work done with less effort and lower fuel consumption.

Nationwide Allis-Chalmers—Baker *Super-Service*

In key cities *everywhere*, Allis-Chalmers — Baker dealers render a complete repair and maintenance service. Everything from a part replacement to a complete rebuild. Every A-C dealer is qualified to repair or install Baker bulldozers *and other tractor equipment*. They stand ready to help you.

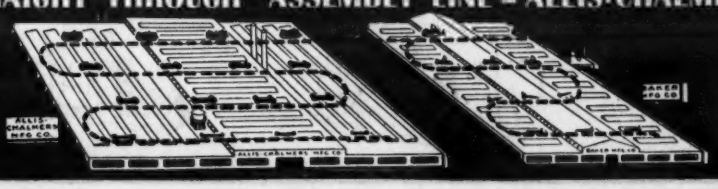
BAKER

THE BAKER MFG. CO.

585 Stanford Ave. Springfield, Ill.

If it Concerns Victory, it concerns us!

"STRAIGHT THROUGH" ASSEMBLY LINE – ALLIS-CHALMERS TO BAKER TO YOU!



The modern Baker plant with its completely equipped fabricating, machining and blacksmithing shops adjoins the Allis-Chalmers crawler tractor plant. When you order an A-C tractor with Baker bulldozer or gradebuilder, your tractor leaves the A-C assembly line, crosses a narrow court and goes on the Baker final assembly line.

A Lathe Converter Expands Shop Work

With a lathe converter, a piece of metal can be milled, ground, bored, or drilled to almost any desired shape. The Master lathe converter, made by Master Mfg. Co., Hutchinson, Kans., is a combination metal-working machine tool, ruggedly constructed, compact and simple in design, and specially adapted for maintenance and tool departments where a wide range of metal-working operations is required. It is particularly suitable for mobile repair units and maintenance shops where weight and space are at a premium. Its simplicity in setups makes it easy to operate and provides an operator with the facilities to perform practically any type of metal-working operation. Limited only by the lathe on which it is used, the converter performs the operation while the lathe holds the work piece.

The Master converter is portable, with interchangeable heads for milling operations, cylindrical or surface grinding, internal grinding, internal key-seating, dividing head for precision indexing, and miscellaneous arbors for adapting all standard milling cutters and tools. It requires only a moment to change the head to convert it for the various types of operations. It is a complete motor-driven unit within itself, used primarily in conjunction with engine lathes but occasionally on milling machines, planers, shapers, etc., as a vertical head.

To set up the converter, the tool post is removed from the T-slot in the compound rest of the lathe, an adapter bar, which is supplied with the converter, is inserted in the T-slot, two cap screws are tightened, and the converter is ready to go to work. It may be mounted in any of three positions on the compound, or directly on the carriage with the compound rest removed.

Maintenance or repair operations, whether rebuilding old or making new parts, can be accomplished in a lathe due to the wide range of operations performed by the converter. In some cases work too large to swing in the lathe, such as grinding large brake drums, boring large wheels, etc., can be done by clamping the parts to the end of the lathe bed with the tailstock removed. Boring can be accomplished with a tool bit in the flycutter arbor, or a spur gear can be cut without a gear cutter by grinding an ordinary lathe tool to the gear-tooth form, using the old gear as a gage, thus making possible the cutting of a temporary gear or a similar part.

Complete information, with many illustrations covering the Master lathe converter, will be found in Catalog No. 10 which may be secured direct from the manufacturer by mentioning this news item.

New Sales Manager For Columbia Cement

W. B. Sippey has been appointed Sales Manager of the Columbia Cement Division of Pittsburgh Plate Glass Co., at Zanesville, Ohio. Mr. Sippey began his career with the Pittsburgh Plate Glass Co. twenty-eight years ago and has been associated with the Columbia Cement Division for the past nineteen years in the sales department, serving as Assistant Sales Manager for four years prior to his present appointment.

Chester R. Steenberg has been appointed Assistant Sales Manager. His headquarters will be at Columbus, Ohio.



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MONEY
TIME and
LABOR
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Gasoline Hammer
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BREAKER

100% Self-Contained
No Air Compressor and Hose
No Battery Box and Cable
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POWER TO SPARE—
Busting Concrete
Breaking Rock
Cutting Asphalt
Digging Shale—Tamping
and many other jobs

Write for illustrated folder
SYNTRON CO.
227 Lexington Homer City, Pa.



THE Federal Government has already appropriated 1½ billion dollars to construct postwar highways, roads and streets. To participate in the benefits of this national program, each state or municipality must be prepared with its matching funds—and their plans should be in the "ready-for-action" stage now!

This plan sponsored by the American Road Builders Association deserves enthusiastic support. It will mean millions of jobs for returning veterans, not only in the construction industry but in durable and consumer goods industries as well. It will directly benefit every American by providing needed modern highways and streets.

This sound, practical plan for peacetime jobs in your community demands your active interest and support. If you have not already done so write the American Road Builders Association, 1319 F Street N. W., Washington 4, D. C. for a free copy of "The Road Ahead," explaining the plan in detail.

CLEAVER-BROOKS COMPANY, 5110 N. 33rd Street, Milwaukee 9, Wisconsin

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS



FOR VICTORY
BUY UNITED STATES
WAR BONDS AND STAMPS

County Road Program For 11 Years Ahead

Schedule Includes $1,528,000 of New Construction of Highways and Bridges; Surveys and Finances for Early Projects Complete

✦ A PROGRAM of thirty-seven separate sections of highway and bridge construction for post-war completion, amounting to $1,528,000, has been announced by Alan N. Buck, Superintendent of Highways, Macon County, Decatur, Ill. The plans for five of the sections, estimated to cost $375,000, are complete and the County Board of Supervisors has made the appropriations which have been approved by the Illinois Division of Highways.

Macon County is on its toes with every one of its completed plans in strict accordance with the master plan of the city and regional planning commissions, and the plans are in such shape that the first five could be advertised for bids, the awards made, and work started within one month after the war.

Surveys have been completed for four additional sections and preliminary surveys made on two others. The estimated cost of these six sections is $115,000, and work could be started on them within a short time after materials become available. The right-of-way is completely vested in the County on all eleven sections.

Preliminary surveys have been completed also on the remaining twenty-six sections and the County already owns 50 per cent of the right-of-way for the 68 miles of highway to be built. Included in this work is a preliminary plan for a bridge over the Sangamon River, augmenting the two existing bridges.

State motor-fuel tax funds now on hand amount to approximately $200,000 and there is an additional $80,000 in the county highway fund. Federal funds will be available through appropriations already planned.

The roads to be improved will be reconstructed with bituminous surfaces, with some regrading and drainage projects. County roads leading to Decatur's new airport are included in the overall program.

11-Year Program

The eleven years estimated to complete the program is based upon normal revenue for highway purposes. All of the projects included are required in the ordinary and reasonable development of the county highway system to serve adequately both the local taxpayer and the visitors.

In a recent interview, Mr. Buck stated, "These specific jobs will provide all-weather dustless traveling surfaces, and will provide line, grade, and right-of-way as considered suitable for increasing traffic demands and in the best engineering design. This program has been in orderly development for several years and is based on several factors, such as traffic counts, school and bus routes, mail and milk routes, farm production, transportation of employees and materials to and from industrial plants and churches and fraternal organizations."

During the war years there has been no outstanding reconstruction of Macon County roads. The Highway Department has sought only to maintain the existing roads and for that purpose has used approximately $50,000 in motor-fuel tax funds annually.

In a recent report to the Commission, Mr. Buck stated: "I would like to point out that it is my belief that, during the war, local governments should prepare plans, obtain right-of-way as necessary, and see to it that highway funds are not diverted to other uses. If the local governments prepare proper plans and safeguard their revenue, it will be possible to institute on short notice a work program, financed and administered locally. This method, we have found by experience in the seven or eight years before the war, is sound, economical, and a more satisfactory way of providing work for those who are in need."

Your money in War Bonds, your blood in the Red Cross Blood Bank, and your waste paper are needed for Victory.

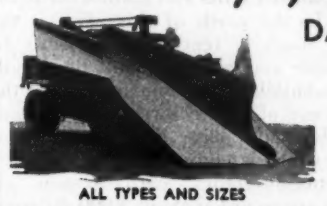
Bay City Enlarges Plant

The constantly increasing demand of the armed services for more Bay City pneumatic-tired and crawler-mounted cranes than could be produced in the existing plant has led Bay City Shovels, Inc., Bay City, Mich., to its third plant expansion since Pearl Harbor. The new addition, recently completed, will make possible a 30 per cent increase in output of both types of mounted excavating and material-handling equipment.

The rubber-tired CraneMobiles being produced in larger quantities are of the 10, 16½ and 20-ton types, mounted on specially designed crane carriers, and the crawler-mounted convertible shovels, cranes and draglines are in sizes from ⅜ to 1¼ cubic yards. This equipment, now under Limitation Order L-192, will be available for civilians after V-J Day.

Another Big Year--For

DAVENPORT-FRINK SNO-PLOWS



ALL TYPES AND SIZES

All indications are that the demand for the engineer-preferred, lighter yet stronger, faster and safer Davenport-Frink Sno-Plows will exceed all previous records. That's why we suggest to you —Check over your equipment NOW—and get your orders placed for the next snow season. We'll cooperate with you in every way.

Complete Information on Request

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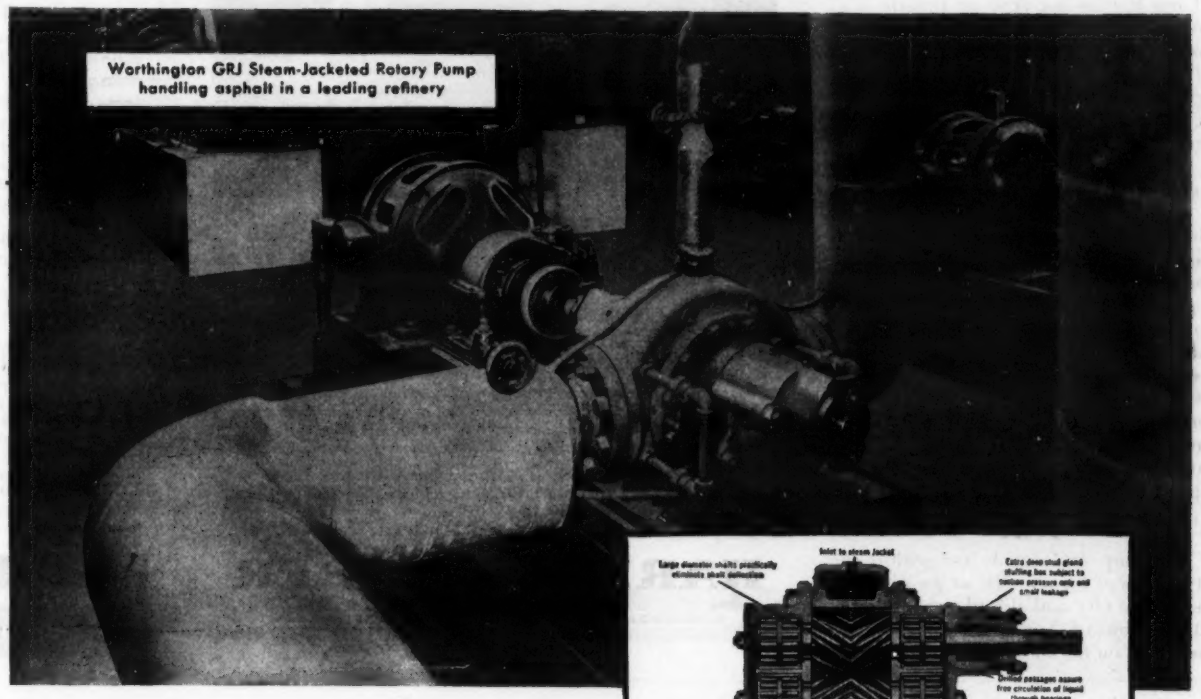
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AGERSTRAND CORPORATION
Muskegon, Michigan

THE STEAM-JACKETED PUMP THAT GETS ASPHALT OFF TO A GOOD START



. . . is also your best bet at the finish

One thing contractors and refiners have in common is whole-hearted respect for the in-built stamina of Worthington Steam-Jacket Rotary Pumps. As a matter of fact, many contractors don't even know that Worthington GRJ Rotary Pumps are installed right in their road oilers, pavers, and trucks. That's because these dependable asphalt handlers have a habit of staying out of trouble . . . so never call attention to themselves.

That's why you'll want to have these same trouble-dodgers keeping asphalt on the go from tank cars to storage tanks to tank trucks to the machines that apply it.

GET ALL THE FACTS

For vital facts a contractor should know about Steam-Jacketed Rotary Pumps for handling asphalt, write for Bulletin W487-B11. It proves that *there's more worth in Worthington. Worthington Pump and Machinery Corporation, Harrison, N. J.*

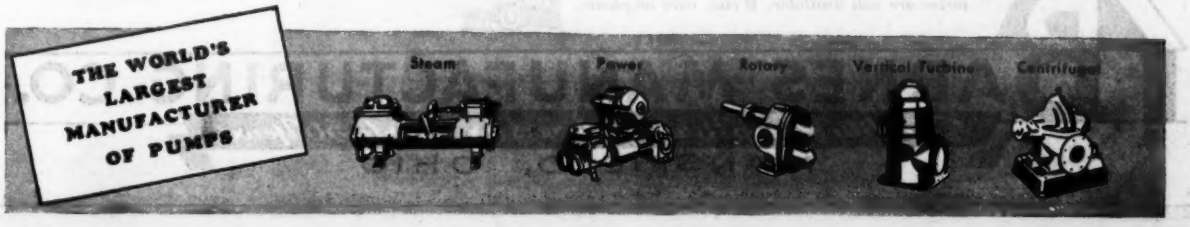
WHY WORTHINGTON GRJ ROTARIES CAN TAKE IT

1. **ROLLER BEARINGS** with more capacity than any other rotary pump.
2. **STUFFING BOX** much deeper than the average.
3. **SPECIAL DOUBLE HELICAL ROTORS** with larger wearing surfaces, free from end-thrust.
4. **HUSKY SHAFTS** mean trouble-free stuffing boxes.

WORTHINGTON

P 5-10

THE WORLD'S LARGEST MANUFACTURER OF PUMPS



Utility Is Combined With Beauty in Shop

Former Fair Building at Fayetteville, N. C., Is Well Organized Division Shop For State Equipment

✦ THAT highway maintenance and repair shops can be buildings with attractive appearance as well as utility value is well demonstrated in the case of the North Carolina State Highway and Public Works Commission Division 3 shop at Fayetteville, N. C., in the south-central part of the Tarheel State. This shop is one of ten having similar functions located in each of the ten highway divisions in the state.

Each division in turn is composed of three districts, each of which has a shop on a much smaller scale where minor repairs, such as tire and tube patching or mechanical adjustments to equipment, are made. The hundred counties of North Carolina are divided among the divisions so that each has anywhere from seven to fourteen counties on its roster. The division shops can handle all but the largest type of repairs, and work of such nature is sent to the huge Central Equipment Depot at Raleigh. Division 3 includes the eight counties of Brunswick, Duplin, New Hanover, Pender, Bladen, Columbus, Cumberland, and Sampson.

In 1931 the State acquired the building in which the main shop of Division 3 is now located from Cumberland County, which was using it as an exhibit hall in its annual county fairs. At first the building was used by various state departments but eight years ago alterations were made and shop equipment installed for its use as a division shop of the Highway Commission. Improvements are constantly being developed to continue this shop as a first-class maintenance and repair unit in the well organized state system for looking after its highway equipment.

Pleasing Appearance

The shop is located just within the city limits of Fayetteville at the southern end of the city and slightly north of the intersection of U. S. 301 with State Route 87, on the west side of the road. A broad expanse of grassy lawn separates the highway, from the main building which is of hollow-tile construction, 250 feet long running north and south x 50 feet wide, with a gable roof of asphalt shingles, and a concrete floor. The main office is located in the center of the east side or front of the building and has pine-paneled walls and fluorescent lighting. To the north of this office is the stock room, a fenced-in enclosure 12 feet wide and extending half the length of the building to the north wall. At the south end of the stock room and adjoining the main office is the stock-room office which is equipped with a Kardex perpetual-inventory card system on which are recorded about 4,000 different items carried in stock. A glance at these



The exhibit hall for the annual fair of Cumberland County, N. C., was purchased by the State and converted into an attractive and well equipped division shop.

cards can tell one immediately exactly how many of a certain part or piece of equipment are left on the shelves or in the stock bins.

Entrance to the shop is made through three 12 x 12-foot sliding doors, one at the center of the rear or west wall, and one at each of the two ends. Before entering the shop, parts and equipment are steam-cleaned outside along the rear wall, steam being furnished by a 30-hp high-pressure horizontal Scotch marine-type boiler fueled by coal. Three vats stand in line; the first one of 200-gallon capacity is used for holding small parts, while the other two holding 275 gallons each are used for motor blocks and radiators respectively. A monorail, supported overhead and equipped with a 1-

(Continued on next page)



QUICK REPAIRS RIGHT ON THE JOB

Don't let breakdowns mean long lay ups! Repair-weld your equipment on the job. Do it in a few hours—save days required to obtain replacement parts.

You can prolong the life of your equipment indefinitely—by building up and hard-surfacing with P&H Welding Electrodes. P&H welding engineers will be glad to help you as to the type to use and procedure to follow. The complete P&H line of welding electrodes includes a size and type for every requirement—for repair-welding; or for building up and hard-surfacing to provide unusual resistance to wear, impact and abrasion.

TODAY call your nearest P&H representative—he's ready to help you. Or if you wish, write us for complete-line booklet.

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- Patented construction which includes a self-mousing action, provides true alignment of load and hoist; eliminates load slippage and hook straightening.
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- Each size of ACLC Safety Hoist Hook replaces 4 sizes of ordinary hooks, resulting in SUBSTANTIAL SAVINGS in inventory.
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Saved . . . more than a ship

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HOTEL WISCONSIN

Highway Shop

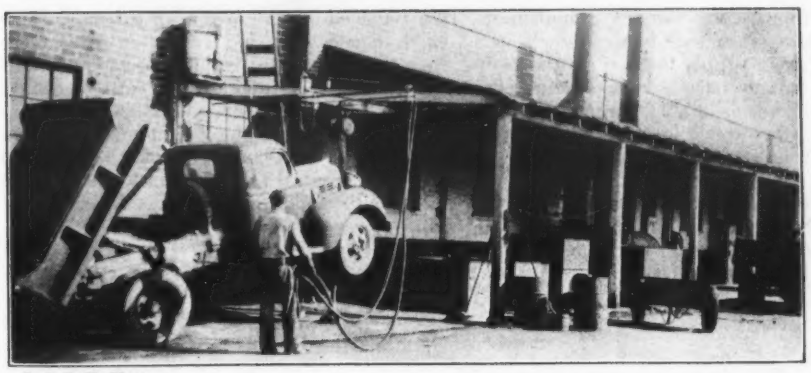
(Continued from preceding page)

ton Yale hoist, lifts parts out of trucks and deposits them in the cleaning vats, or lifts the front end of cars and trucks to enable a shop man to clean the chassis and under-carriage with a steam jet. A solution of 8 ounces of Permag to a gallon of water is used for cleaning the parts which are then rinsed and brought inside the shop for repairs. Also located outside the shop is an Ingersoll-Rand 50-cf air compressor, driven by a 10-hp electric motor, which furnishes the shop with compressed air.

Shop Interior

Because of its comparatively narrow 50-foot width, good natural lighting is secured in the shop through large windows located in both the front and rear walls. Additional light is provided by three rows of overhead electric bulbs equally spaced across the width of the building, with a row of lights every 25 feet lengthwise. Steam heat is supplied through sixteen radiators placed along the rear wall while air circulation is assisted by four overhead Modine fan units. A low-pressure coal-burning vertical boiler located in a lean-to just outside the rear door furnishes the heat. Just inside the rear entrance is a hydraulic lift, operating with compressed air on an oil cylinder and used for greasing and chassis inspection.

The northwest section of the shop from the north wall to the center rear door is given over to overhauling, assembling, and repairing of trucks. Two overhead 1-ton hoists, a Peerless and a Yale, do the heavy lifting in this area. Each bay has a heavy-duty vise mounted on a post bracket but the mechanics' wood benches, 40 x 24 inches with a ⅛-inch steel-plate top, are mounted on casters so that they may be pulled around to the work. It has been found that this system of taking the tools to the job is more efficient in the case of heavy repairs than bringing the work to the tools as is done when the benches are permanently placed along the wall. This latter method is still used in the shop where the machine being overhauled is light and easily handled. Air outlets are located in every bay, and this section also has an electric outlet for the use of the portable Owen electric arc welder which can be moved around to any location in the shop.



C. & E. M. Photo

At the North Carolina Division 3 highway shops, equipment is thoroughly steam-cleaned in the rear of the main building with a solution of Permag before overhauling.

Machine Shop

The machine shop and welding department are located in the southwestern end of the long building. Much of the machine equipment is operated by belt drives connected to a line shaft which is driven by a G-E 10-hp motor placed on the attic floor of the shop. Included in this equipment is a Heald internal grinder with belt drive, used for cylinders, alongside of which is a Sunnen pin-hole grinder, operated by a small G-E motor of its own. Crankshaft work is done with a Norton 26-inch external grinder with belt drive. The ever useful arbor press is also found in this section, together with a Sidney 17-inch 8-foot-bed belt-driven lathe. Installed on a 3-wheel platform to make it portable is a Sioux flexible-shaft grinder which is used for grinding brake drums mounted for that purpose on the Sidney lathe. Used with this grinder is a 2-inch-diameter flexible suction line through which the grinding dust is removed by an old Champion forge blower converted and adapted for this purpose.

Continuing along through the machine shop are found a Mogul Metallizer, used chiefly for building up crankshafts with metal; a 24-inch shaper with belt drive; and a bench grinder, also belt driven. Here also are a Canedy Model 28 drill press, and a Buffalo 20-inch drill press powered by a belt from a line shaft driven by a 5-hp G-E motor. Pistons and shafts are turned on a Cleveland lathe with a 10-inch 4-foot bed and belt drive, next to which is a Kwik-Way piston

(Continued on next page)

MAINTENANCE



For road and shoulder (other than sod) maintenance, and for spreading mixed in place material the BURCH DRAWN TYPE ROAD MAINTAINER is the ideal machine. Power hydraulic control means ease and speed of operation.

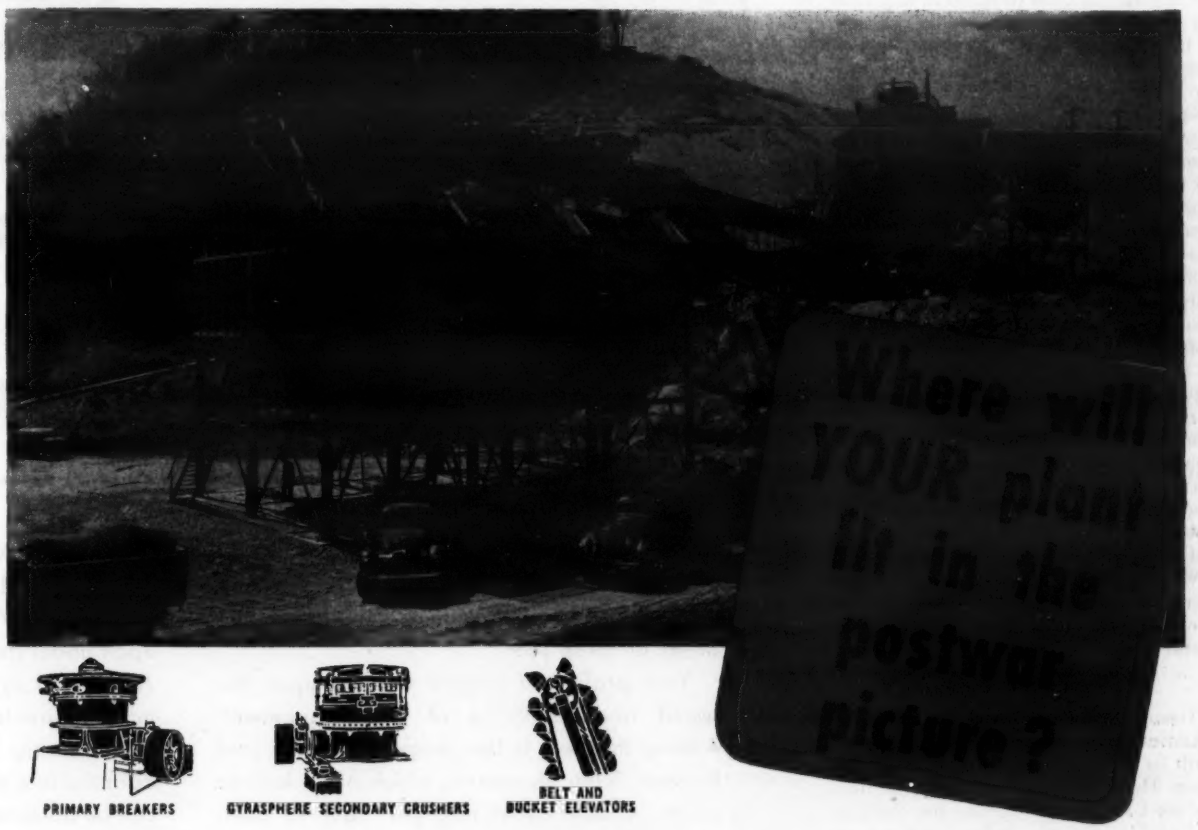
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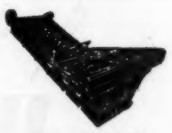
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Highway Shop

(*Continued from preceding page*)

grinder and chamfering tool operated by its own motor. An old piece of equipment still in service is an Army Ordnance shaper driven by a 5-hp motor, placed near a bench grinder and buffing wheel, working off the belt drive. Near the end of the limits of this part of the shop are an Armstrong motor-driven power saw with a 12-inch blade; a Davis key seater with belt drive; a boring machine for connecting rods driven by a 1/6-hp G-E motor, and a 60-ton Manley hydraulic press.

Welding

The southwest corner of the building is partitioned off to form an area 24 x 14 feet for use as a welding shop and contains a portable oxy-acetylene cutting unit and an Owen electric arc welder. This electric welder can be moved to any part of the shop where its use is required and its cord plugged in at a nearby outlet. A 5 x 4-foot metal work table 6 inches thick is strong enough to hold practically anything being worked on in this section. Wooden work benches with metal tops hold vises and rebabbitting jigs, and a Smith acetylene generator manufactures the gas used in this type of welding. In connection with the welding is the repair of auto radiators which are tested in a tank, 5 x 4 x 1½ feet deep, by plugging the usual water inlet and outlet pipes and forcing air in through the overflow pipe while the radiator is submerged in the tank. In this way leaks are detected and repaired.

An interesting piece of shop-made equipment is a machine for cutting large-size metal washers and circular plates up to 24 inches in diameter. It consists of an old brake drum mounted on a post so that it can revolve, while above it on an adjustable arm is laid the cutting torch. The piece of metal to be cut to a circular shape is laid on the revolving drum, the torch placed in position and fired, while the drum is spun around. The entire unit is built on a metal frame.

Engine Rebuilding

Gasoline engines used in the eight counties comprising Division 3 are rebuilt in the southeastern quarter of this shop. Here are located 6-foot-high double steel lockers containing the mechanics' tools and work clothes, and a work bench for each mechanic. Some of the equipment in use consists of a Kwik-Way valve refacer, a Sunnen connecting-rod aligning machine, a Van Dorn valve-seat grinder, a Kwik-Way line boring machine, a Kwik-Way valve-seat replacement tool, and a Lempco cylinder-boring machine. The engines are moved about by a Peerless 1-ton overhead hoist which moves from end to end of an I-beam, which in turn runs lengthwise of the shop on other rollers on I-beam tracks.

When the engines are completely rebuilt, they are run for 25 hours in a thorough test before being replaced in a car or truck. The testing block used is a dual affair in which two rebuilt engines are placed abreast in similar frames, while in back of these engines are two old engines in permanent position used to start the rebuilt units. Two gas tanks, one between each set of engines, supply the fuel for the testing. No radiators are used, as cooling is secured by means of a 250-gallon tank which furnishes water for circulation through all four engines.

Also located in this part of the shop is the upholstery and cushion repair section which has a Singer sewing machine for its main item of equipment. Batteries are charged in a 12 x 12-foot fenced-in wire area with a Hunter-Hartman battery charger and an Allen rectifier. Motor oil is dispensed from drums located just within the rear entrance, while equipment is fueled from a gas pump placed outside this door. Modern wash rooms and lavatories are situated in a central position along the east side of the building.

Other Structures

North of the main shop is a 60 x 40-foot corrugated-metal building used for storing oil and grease, while to the south is a 20 x 40-foot wooden structure where trucks and other equipment are painted the shade of brown characteristic of the North Carolina State Highway and Public Works Commission. DeVilbiss spray guns are standard equipment in this paint shop.

Directly west and to the rear of the main shop is a wooden building, 30 x 90

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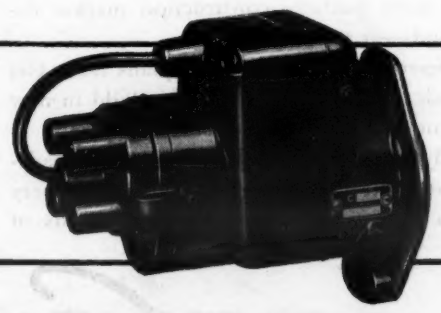


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Prophecies fly thick and fast about airport building in the first five postwar years. Whatever guess you accept, there'll surely be hundreds of these jobs.

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When you buy power equipment make sure a WICO provides the spark. Scores of power products by America's leading manufacturers are equipped with WICOs. These manufacturers know WICO magnetos can be depended upon under the toughest operating conditions. The WICO Type C shown here and used on much contractors' equipment is time-tested, yet is constantly being improved. It has been adapted to a wide variety of applications, and can be obtained for replacement of other ignition through more than a thousand authorized WICO service stations in the United States alone. The Wico Electric Company, West Springfield, Massachusetts.



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On the Rud-O-Matic Combination Magnet Reel and Tagline, both drums revolve together. In attaching the electric magnet cable, a little slack is allowed. The tagline cable is attached with sufficient tension to steady the magnet. Both cables then feed back and forth in the same relation as originally set. An inner spring on the reel drum provides the tension. With this equipment there is no chance for the electric cable being pulled apart or jerked loose from connections.

Most Crane Manufacturers have adopted Rud-o-Matics as standard equipment



★ If War Bonds aren't safe, no other investment matters. So buy War Bonds with every dollar you can find.

Highway Shop

(Continued from preceding page)

feet, with a concrete foundation, where heavy equipment such as tractors, graders, shovels, etc., are brought in for repair and overhaul. Equipment enters through a door in the north wall, 12 feet wide x 14 feet high, and there is also a 12 x 12-foot door in the east wall. This building is heated by the same boiler that heats the main shop and is equipped with air outlets and connections for the electric welding machine. A Yale 2-ton hoist covers the shop from end to end and side to side on overhead beam tracks.

Equipment Serviced

Division 3 maintains about 1,000 pieces of equipment, including 37 passenger cars; 38 ½-ton pick-up trucks; 201 1½-ton trucks; 53 Corbitt and FWD 3-ton all-wheel-drive trucks; 21 crawler-type tractors from 35 to 75 hp; 28 power graders; 68 pull-type road graders; a Link-Belt ½-yard and a Hanson ⅜-yard shovel; an asphalt plant; mowing machines, both tractor and pull-type; harrows; scarifiers; water pumps; portable air compressors, air hammers and drills; concrete mixers; and other sundry equipment.

Personnel

The war has reduced the number of employees from 50 to 33 working in the Division 3 maintenance shops, with from 20 to 25 employed in Fayetteville and the remainder stationed in the three smaller district shops. One district shop looks after four counties while the other two shops have two counties each.

J. W. Upton is Division Mechanic in charge of the Division 3 shops at Fayetteville under the direction of S. C. Austin, State Equipment Engineer. W. Vance Baise is State Highway Engineer for the North Carolina State Highway and Public Works Commission.

Costa Rica Road Work

Two important sections of highway in the Central American republic of Costa Rica have recently made the news. One is the "holing through" of the most formidable barrier along the 3,356-mile Inter-American Highway to Panama, and the other a vital access road to a cinchona plantation being developed to furnish much needed quinine for the battle with malaria.

Breaking through "Death Pass", whose highest point is 10,970 feet above sea level, is a momentous event in Costa Rica's history, marking a great stride forward in connecting Costa Rica by highway with her neighbors, although only a pioneer road is now available. In order to get construction equipment to the scene, an access road had to be built to San Isidro from Dominical, an anchorage on the Pacific Coast. This road is 25 miles long, with grades up to 17 per cent. The Death Pass highway section will not be ready for all-weather travel until early next year, but the hardest part of the job has been done. This section of the Inter-American Highway is being built by the Ralph E. Mills Co., contractor of Frankfort, Ky., under the supervision of the U. S. Public Roads Administration.

Because of the importance of the development of cinchona plantations, the Public Roads Administration during the past year supervised the construction by one of the Inter-American Highway contractors of an 8-mile access road from a junction with the improved Poas Volcano road, 25 miles north of San Jose, capital of Costa Rica, to a cinchona plantation. The U. S. Commercial Co., which is developing the plantation, allotted $340,000 for road construction work in June of last year. Surveys and initial construction activities were under way by late July, and work continued throughout the rainy season, in spite of a precipitation of 40 inches in a month.

The road is 16.4 feet wide, with 3-foot shoulders and a maximum grade of 12 per cent. The highest point on the road is approximately 5,800 feet above sea level. Stone for the stone base and crushed-stone macadam surface was secured from old quarries in the vicinity, where rock crushers were set up to produce the surfacing materials. Concrete aggregates for the bridge abutments also were produced there.

Write for Details



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Pierce-Bear 2-5 Tons Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Narrow rear roller gives heavy-duty compression. Built-in water tanks for wet rolling. Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine.

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"SUBWAY" Air Hose

Style D-154. One of the oldest and best-known brands in the Goodall air hose line. All-Synplastic construction, with tube, carcass and cover built to give *extra* service on all air jobs requiring heavy-duty hose. Sizes ½" to 1¼", inclusive.

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GOODALL Concrete Placing Hose . . .

Style S-69. Built to specifications based on a thorough knowledge of the service. Rugged construction throughout assures maximum resistance to wear and abuse; and the tough, specially compounded tube withstands severest abrasion. Hose is marked in numerals 1, 2, 3 and 4, spaced equally around the circumference, to provide an easy check on surface wear. Suitable for working pressures up to 125 lbs. per sq. in. Regularly furnished in 6" diameter, but can be supplied in any required size, and for any working pressure.



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Hayward Buckets



In the new Heil Hydro Steer unit, the steering wheel controls hydraulic pressure on the individual wheel cylinders to provide easy steering of heavy-duty earth-movers.

Fingertip Steering For Big Dirt-Movers

A new hydraulic steering mechanism is to be offered as a post-war product for use on heavy-duty automotive equipment, according to a recent announcement by The Heil Co., Milwaukee 1, Wis. While some previous remote steering units for off-the-highway equipment have used hydraulic boosters for mechanical steering, this is said to be the first fully hydraulic unit. It provides true fingertip control for huge earth-moving equipment and makes it possible to build two-axle models that eliminate the jack-knifing tendency of multiple-axle construction equipment.

The Heil Hydro Steer was designed by Henry French, Heil engineer in charge of development, and has been used extensively on some of the heavy motorized war equipment built by the company. Cross-country warfare has proved the practical advantages of big, simple tires over many smaller ones for rough going. They operate at a lower pressure per square inch, provide better traction, more flotation, and offer less rolling resistance than multiple wheels.

The new Hydro Steer has no mechanical connections between the steering wheel and the axles. Impetus is transmitted through flexible ducts or hose much the same as on conventional passenger cars. The steering head, to which the steering wheel is attached, contains a steering drive, metering pump, steering valve, relief valve, check valve, and oil reservoir. From the oil reservoir in the steering head, the oil is drawn through a suction line to an engine-driven hydraulic pump.

The steering wheel serves merely as the hydraulic-control-valve lever for the power steer. When the steering wheel is turned to the right, the pump forces oil into the left-hand cylinder, causing right-hand steering movement. For a left-hand turn the pressure is on the right-hand cylinder. The front wheels of the vehicle remain in a locked position until the steering wheel is turned to allow a flow of oil in either direction. The metering pump gives a constant ratio between the steering-wheel movement and vehicle front-wheel movement.

Should the power-driven pump ever fail, the metering pump automatically becomes the power pump, and draws oil through the check valve from the oil reservoir and forces it into the steering cylinders by manual effort on the steering wheel only. This gives the added safety of a standard mechanical steering gear.

Practical applications of the Heil Hydro Steer include its use on earth-moving wagons, scrapers, graders, and other construction equipment. Full details and prices may be secured direct from the manufacturer.

Oil Purifiers, Reclaimers

A 6-page folder on the construction, operation, and applications of the YM line of oil purifiers and reclaimers is available from the Youngstown-Miller Co., 675 Main St., Belleville, N. J. A feature of the folder is a detailed diagram illustrating the sequence of operations in the YM process, from the time the dirty oil is pumped in under automatic float control to its return, cleaned, to storage tanks or to the diesel engine under its own pressure. These reclaimers, which are described as efficient, economical, and easy to operate, are available in a number of models from 2½ to 120-gallon capacity per 70-90 minutes.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may secure copies of Bulletin YM-600 upon direct application to the company and mention of this review.

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When the champion rifles his drive down the fairway, the gallery murmurs admiringly, "Doesn't he make it look easy!" And, for him, it *is* easy. Timing perfect, swing perfect. The secret is *relaxation.*

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Plenty—when it's a Form-Set rope. With stresses, strains, and tension reduced, a rope has high resistance to bending fatigue—and that means longer life, fewer replacements.

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Equipment to Fit the Job

Numerous on-the-job shots of clearing, grading, snow plowing, pipe laying, and other highway and construction work are contained in a 16-page color booklet just received from the Caterpillar Tractor Co., Peoria 8, Ill. Stressing the importance of balance between the capabilities of machinery and the requirements of the job, in the design and manufacture of the equipment, between prime and auxiliary equipment, and other considerations of cost, durability, maintenance, and availability, this colorful and informative book contains helpful suggestions for specific equipment combinations to be used on individual jobs.

Copies of the booklet, "Why the Owner Profits" may be obtained by writing to the company for Form 8903.



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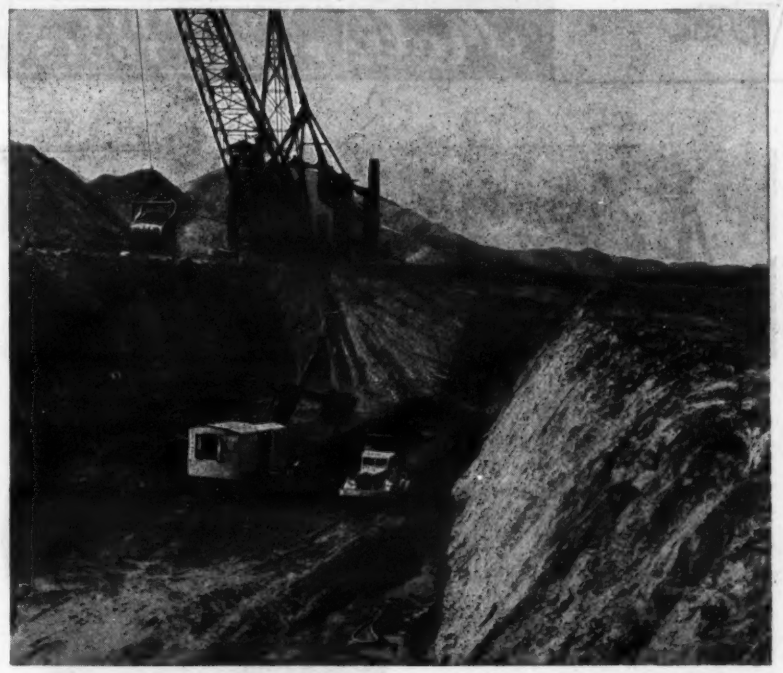
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A new series of bulletins on shop tools for overhauling automotive equipment has recently been issued by Sunnen Products Co., 7900 Manchester Ave., St. Louis, Mo. These 2 to 5-page bulletins cover bearing sizers, bushing grinders, cylinder grinders, rod aligners, valve lifters, and other service tools. If you are considering either immediate or post-war purchases, you should have these illustrated bulletins with the prices now. Copies will be furnished promptly if you write to Sunnen.

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No time, material or labor is wasted when concrete is placed with a Mall Vibrator. It places more concrete than any other vibrator of the same size. It permits the use of a stiffer mix—economizing on sand, water and cement. It assures a stronger water-tight job, free from honeycombs and voids. Variable speed gasoline engine also operates 8 other quickly interchangeable tools.

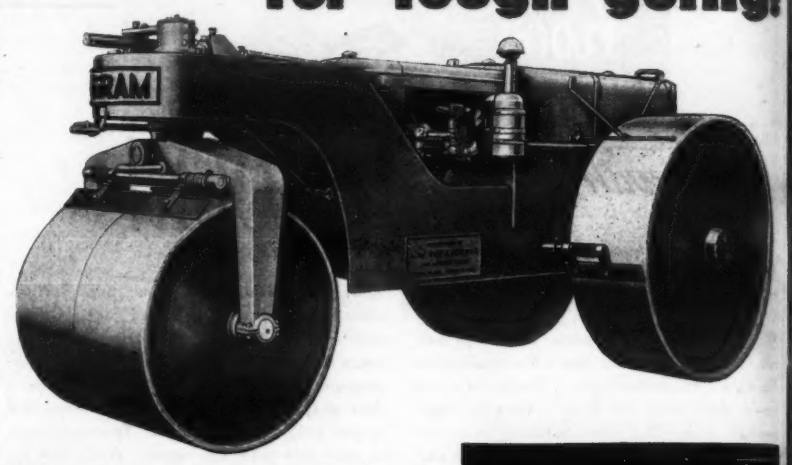
1½ H.P. Gasoline Powered model available, also 3 H.P. round base or wheel barrow mounting, 1½ H.P. Universal Electric, and 7500 r.p.m. Pneumatic units.

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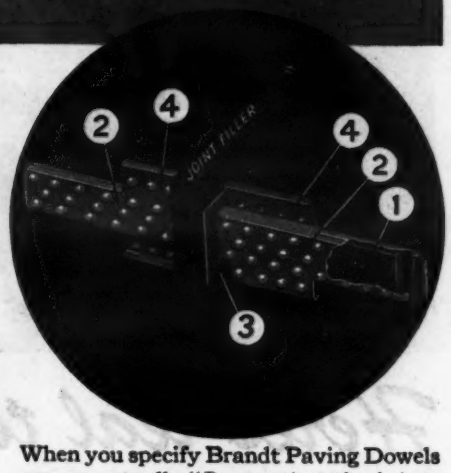
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1-Rectangular Dowel — Has 2½ times the carrying capacity of the conventional round dowel of same cross-section area over 1" joints; 15% stiffer than the usual commercial steel; eliminates hazard of dowel embedment.

2-Dowel Socket—A tight and immovable socket encasing the dowel allows dowel to move when paving expands or contracts; positive assurance against dowel freezing, and resulting spalling of concrete.

3-Dowel Flanges—Held firmly against filler to insure proper alignment even during roughest handling in placing concrete. With installation holder removed, they are free to move with expanding or shrinking concrete.

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When you specify Brandt Paving Dowels you are actually "*Protecting the joints —insuring the paving.*" For Brandt Dowels assure you of load transfer capacity across the joints to suit wheel loads, and the dowel sockets scientifically distribute these loads to prevent stressing adjacent concrete. Most important of all, in construction Brandt Dowels assure accurate and positive dowel levels and alignments—*quickly* and *simply*.

The years of research, service testing, and installing behind Brandt Dowels are a guarantee of this. So don't put through another paving job—don't specify *any* other dowel assembly—until you get full information on how these precisely engineered Brandt Paving Dowels give you *better* paving jobs, at *lower* total cost!



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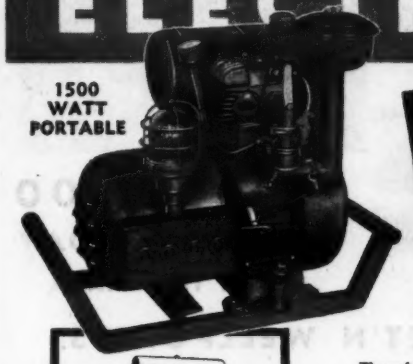
Highway Products Division

CHARLES T. BRANDT INCORPORATED

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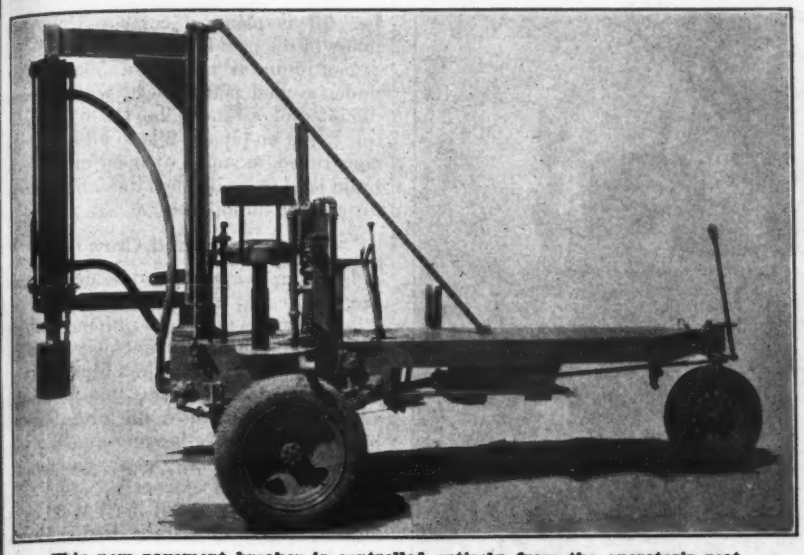
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Factory representatives strategically located throughout U. S. A. and Canada.

"U.S." ELECTRIC PLANTS

☆ INVEST IN MORE WAR BONDS NOW! ☆



This new pavement breaker is controlled entirely from the operator's seat.

Trailer-Type Breaker For Pavements, Floors

A new 3-wheel-type pavement breaker, adaptable to such work as breaking out floors, small sections for highway patching, or any other not too heavy jobs, has been developed by the Rapid Pavement Breaker Co., 1517 Santa Fe Ave., Los Angeles 21, Calif. The vertical boom shown in the illustration can be laid back on its axis, making it easy to tow the machine up to 50 miles an hour by any light car. It also enables the machine to be moved through a door in a building where there is low headroom.

With the boom raised and held in place by the brace from a pin at the top of the boom to the deck of the machine midway between the front and rear wheels, and with a portable compressor attached to the machine, it is ready to operate. It cuts a width ranging from 6 inches to 5 feet, and is entirely controlled from the operator's seat. The swing and the blow as well as the propelling of the machine while in operation are pneumatically controlled by levers close to the operator. It is said that this machine will increase the output of a compressor many times as compared with the use of a standard jackhammer. It requires but one man to operate it.

Complete information regarding this paving breaker, together with prices, or on its heavy-duty machine, may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Parkway Extension, A Post-War Project

One of the first and most important of the post-war highway construction projects to be undertaken in Connecticut, and for which funds are now available, is the construction of the section of the Wilbur Cross Parkway between Orange and Meriden, according to the biennial report of William J. Cox, State Highway Commissioner. This stretch is one of the difficult bottlenecks between the important centers of New Haven and Meriden where current traffic needs south of Meriden require use not only of old U.S. 5 but of the Hartford Turnpike as well.

This section of highway includes thirty-six bridges, mostly of the highway grade-separation type, for which plans are complete on twenty-six and approaching completion on the remaining ten.

All of the right-of-way for this project has been secured at about normal real-estate prices, according to Commissioner Cox's report.



THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

Beebe Bros.
ALL STEEL HAND HOIST
SEATTLE, U.S.A.

Compact—Powerful—Safe

STANDING ROOM ONLY FOR DURATION

Beebe Bros. All-Steel Hand Hoists carry the highest resale value of any piece of equipment in the world. If you have one not in use, sell it. Many more than are available are urgently needed in the win-the-war program. Thanks.

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• Here's a machine that performs three jobs at once. And you can keep it moving steadily—all day long. In rapid succession, truckloads of asphalt mix are mechanically spread . . . "kneaded" and thoroughly *tamped* in place . . . and automatically leveled—all in one operation.

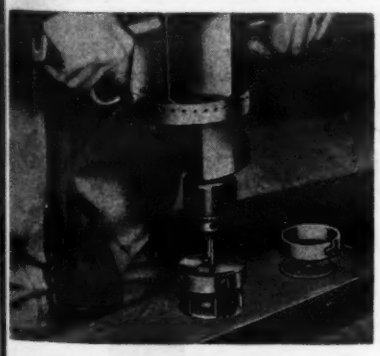
Moreover, the Barber-Greene Tamping-Leveling Finisher helps provide fast, cheap road construction by reducing the amount of rolling for adequate compaction . . . eliminating hand labor behind the machine . . . decreasing truck delay . . . cutting out the hazards encountered in other methods.

You'll find that a B-G Finisher saves days and dollars on every black top paving job. It handles mixes extremely difficult or impossible to lay by other means . . . maintains a mat of uniform thickness, ranging from ¼-inch to 6 inches . . . holds an accurate crown . . . and tightly seals joints with adjacent strips.

Before the call comes for the hurry-up resurfacing of worn-out highways, and the speedy construction of new roads and airports, plan to add a B-G *Tamping-Leveling* Finisher to your equipment. Write for literature outlining the functions and performance of this versatile machine. Barber-Greene Company, Aurora, Illinois.

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TIMBER CONNECTOR GROOVING TOOLS by CIRCO . . .



increase speed, cut labor costs in preparing timber for connector ring joining. Special plow-type blades take a fast, clean cut, throw out chips, do not clog, run at high speeds without "burning."

Blades sharpened and replaced on the job without special tools. CIRCO Split-Ring Groover comes in 3 sizes: 2½", 4", 6" diameter.

Write for Illustrated Bulletin

CIRCO TOOL CO.
Specialized Cutting Tools
902 W. Vliet St., Milwaukee 5, Wis.

Giant Dredge Helps To Dig Road to Tokyo

(*Continued from page 2*)

coral shelves rising up to low-tide level obstructed the inner-harbor entrance.

Coral hardness varied from the beach line seaward. As probings neared the outer harbor, they got progressively harder until solid lime rock of calcareous origin, probably of the Devonian period, was encountered. The YM-20 was first spotted over a shoal ranging from hard chunks, finger and tree coral, to blasted rock.

Several types of cutters were tried, but operations finally settled down when Lieut. Commander Herman J. Rossebo and Mr. Wiseman, civilian dredge captain, built a bastard contraption out of a standard 6-blade basket-type cutter. Six teeth were welded to each blade with stainless-steel rod, and the area around each tooth shank was reinforced with welding rod and steel stock. Three rings were welded inside the blades to keep rocks larger than 18 inches out of the pump.

The hard coral at this Pacific station is not abrasive so far as the cutter head is concerned, probably because most cutter action in coral tears or breaks the rock. The YM-20 showed, after digging 1,000,000 yards, that the "Rossebo-Wiseman" cutter would damage before it wore out. Teeth tore off, welded metal crystallized and broke under shock strains, and even the blades failed occasionally.

Digging in coral is tricky insofar as swing cables go, too. They hang up in back of rocky pinnacles and are subject to shock loads and corrosion. When the dredge belonged to McWilliams Dredging Co., 1¼-inch-diameter 6 x 19 Langlay modified Seale construction was used, and the company always specified preformed wire rope on its orders for swing cables and deck ropes. A sizable stock of this new improved wire rope which lasts up to 700 hours in this kind of service was brought along when the YM-20 moved out into the Pacific.

It was found immediately when inferior swing ropes were installed, after the supply of preformed was exhausted, that service life dropped 50 per cent. Because the work required considerably more setups, on the average, than normal contract work, the time spent in replacing swing and hoist ropes was not embarrassing to the job.

Production and Pipe Line

An 84-inch-diameter pump runner with four vanes has worked very well in the Pacific coral, and the YM-20 has consistently dug in excess of 800 cubic yards an hour, hitting a high of 1,800 yards an hour. The material in suspension leaves the pump at an average velocity of 20 feet per second, 13½ miles per hour, travels through a deck pipe and out the stern. Four female pipe connections on the stern, fastened on male joints, allow the dredge to swing free over the 300-foot-wide cut she ordinarily digs.

The YM-20 customarily operates with 3,000 linear feet of discharge pipe and a 12-foot lift above the water surface. The operations cover a vacuum range to 22 inches, with 16 inches a fair digging average. The average pipe-line pressure is 65 pounds, though this will rise as the length of line increases.

Her pipe line is spiral welded for great strength and the 72-inch x 30-foot pontoons which carry the floating section on 40-foot centers are braced with 12 x 12-inch timber strongbacks attached between the cleats on the outer ends. Her floating pipe line is quite stable in rough water.

Military dredging features land accretion as well as harbor deepening, and for this reason the equipment on a Seabee fill is plentiful compared to jobs many of the men knew in civilian life. It is not unusual to find a 5-man crew under a chief petty officer, with a crane mounted on a Caterpillar D7 or D8 tractor, to put on pipe. Where fill limits are constricted, as many of them must be to build land to established lines, bulldozers are used to build levees.



A Seabee shore crew uses a truck crane to make a shore connection in the discharge line of the dredge YM-20 which is delivering coral rock to build that "road to Tokyo".

Controls and Crew

Digging, swinging, and ladder controls are handled by the operator in the YM-20's operating house. Equipment there includes mechanical controls; a magnetic compass mounted in a binnacle and compensated; gages for line pressure, vacuum, air pressure on rams, water pressure on rubber bearings; a hauling gear ammeter; cutter-motor ammeter; telephone; and clock.

The 101-man crew of the YM-20 sleeps and eat largely aboard the dredge. Additional living quarters were built by the Seabees over the second deck. Eleven civilian technicians, many of them o

(*Continued on next page*)

McCAFFREY TRACTOR SHOVEL

WITH RUD-O-MATIC CONTROL

These Features Make It Your Best Choice—

100% CABLE CONTROL OF BUCKET
Permits gradual dumping of the load.

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WEIGHT CENTERED ON TRACTOR FRAME—

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BUCKET CAN REACH OVER CENTER OF TRUCK BEING LOADED—

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RIPPER CARRIED ON MACHINE READY FOR IMMEDIATE ACTION—

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LOW OVER-ALL HEIGHT FOR TRANSPORTING—



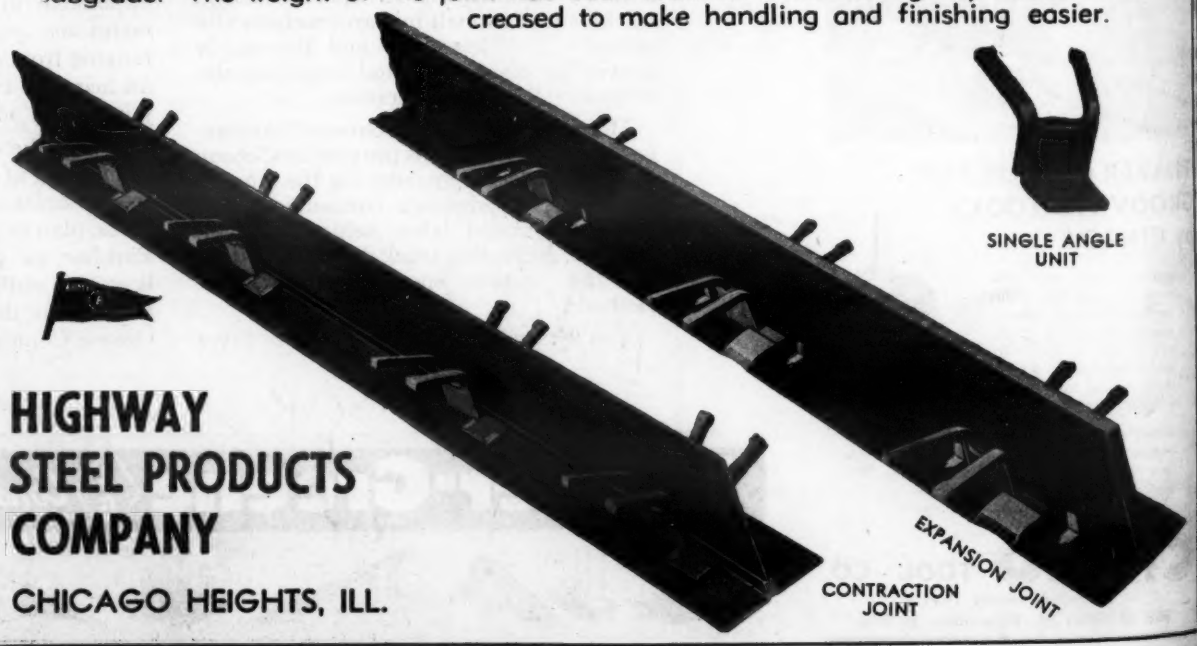
DIGS • GRADES • RIPS • LOADS

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TRANSLODE Expansion and Contraction Joints have been giving excellent load transfer performance on thousands of miles of American pavements since 1932. Today's improved and simplified design retains the continuous base which makes installation easier and seals the joint against the infiltration of dirt from the soft subgrade. The weight of the joint has been reduced while the rigidity has been increased to make handling and finishing easier.



HIGHWAY STEEL PRODUCTS COMPANY

CHICAGO HEIGHTS, ILL.

Giant Dredge Helps To Dig Road to Tokyo

(Continued from preceding page)

the YM-20 since she was built, were brought along on a short 6-month contract to pass along to the Seabees any peculiarities, or idiosyncrasies, of this particular machine.

Auxiliary Floating Equipment

The YM-20 was built with forward booms to permit her to move her own swing anchors, but this was not found practical in the Pacific. An anchor scow powered by a Waukesha engine and 2-drum Skagit hoist, and self-propelled by a Murray & Tregurtha Model O-2 outboard engine, moves the anchors.

Dredge tugs include the 59-foot Plato, equipped with a 200-hp engine; and the Zephyr, a 65-foot tug powered by a 300-hp Atlas Imperial engine. The Zephyr has, in addition to its main engine, a 16-hp Lister diesel driving a generator and bilge pump, a Continental-driven generator, a Crocker-Wheeler-driven compressor, a washing machine, and galley equipment. Six men sleep on the Zephyr. As is the case with most big tugs handling the heavier work, the Zephyr is under way only about 12 hours a day, compared to 18 hours on the Plato which handles much of the small towing and passenger service.

In order to make certain that shoals do not exist after dredging, a 10-ton I-beam sweep is used on a self-propelled barge. Sometimes blasting is necessary to remove tough obstructions.

Repair-Parts Problem

The hardest problem of the Pacific, according to Commander Rossebo, is the supply of repair and maintenance parts. The transportation and procurement of these items is a problem in anybody's book, specially when the job is 7,000 miles from home.

The battalion command recognized this, and a repair-maintenance department was set up under Lieutenant John Vasich, a dredgeman with years of experience behind him in the service of Standard Dredging Co. Lieutenant Vasich's department not only orders repair parts and supervises their installation, but it foresees potential breakdowns and gets ready for them.

Equipment Aboard the YM-20

The most unusual feature about the YM-20 is her modern Babcock & Wilcox boiler, which generates an unusually large amount of horsepower per gallon of fuel. The YM-20 is a steam-electric rig, converting the steam to electric power for the operation of all auxiliaries except the main pump and one steam-driven boiler feed-water pump.

The exhaust steam from this pump is used for heating the feed water in an aerating heater to approximately 220 degrees F. This pump then sends the feed water from the aerating heater to an extraction heater where bleed steam from the main turbine increases the water temperature to 300 degrees F before it is discharged into the boiler. Superheated steam reaches the turbine blades at a temperature of 725 degrees F.

Dearborn feed-water softening treatment is used on boiler feed water. Tests for salt and alkalinity are run every 8 hours. Chemicals are added when indicated by the tests. Tolerance limits are 15 grains per gallon on the salt content; 9.5 to 12.5 grains per gallon on alkalinity.

The following is a detailed list of the YM-20's power equipment, with comments regarding the use of each piece of machinery:

Main Boiler: a Babcock & Wilcox sectional-header marine water-tube type producing 52,000 pounds of steam per hour at 450-pounds-per-square-inch normal operating pressure, and equipped with an air preheater and interdeck superheater. It has induced draft, is oil fired, and the average fuel consumption per 20-hour digging day is 210 barrels.

Boiler Control Board: made by Bailey Meter Co., this gives automatic control over the entire steam-generating process by operating, from existing steam pressure, in such a way that the admission of fuel oil to the burners is controlled and the air for combustion is metered.

Main Generator: a 750-kw 230-volt General Electric, driven by a 6-stage G-E steam turbine, furnishes all electrical power for operating small pumps, cutter, hauling gear, blowers, and kitchen equipment.

Main Turbine: a General Electric 4,000-hp 13-stage double-reduction gear unit operating at a top speed of 4,150 rpm. The turbine-pump gear-reduction ratio is 11.86:1.

Main Pump: a 28-inch centrifugal with 34-inch suction and 28-inch overhead discharge. Nickel-alloy liners are

(Continued on next page)

LITTLE RED DEVIL
Light and Power for the Contractor
Superior Features
1. Constant Voltage
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4. Flyball Governor
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Diesel and gasoline engine driven light and power plants 2 to 50 K.W. Floodlights and portable poles.
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Model DC 600, on steel wheels $725.00


ERIE OFFERS the most complete line of digging and rehandling buckets offered by any single manufacturer ★ Uncle Sam liked our bucket designs and ordered thousands for special digging jobs on all fronts ★ It will pay you to get an Erie Bucket for it will be made to fit your crane, material and cycle of operation ★ We have proved scores of times that an Erie bucket designed for the job will pay for itself in a predetermined period and then pay off in steady profit ★ Whatever you handle you can do it faster and easier with an Erie ★ Erie builds 10 types of buckets but sells predetermined bucket performance that must pay for the bucket ★
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BUCKETS
AGGREMETERS • TRAVELING CRANES
PORTABLE CONCRETE PLANTS


Giant Dredge Helps To Dig Road to Tokyo

(*Continued from preceding page*)

installed to resist coral abrasion.

Main Condenser: a Worthington single-pass surface type with 4,250 square feet of cooling surface. Both the generator and pump turbines exhaust into this condenser. Sea water circulating through the tubes removes heat and condenses the steam circulating around the tube surfaces.

Cutter Motors: two 450-hp Electro Dynamic variable-speed motors drive the cutter shaft through Falk reduction gears, and operate at a variable speed of from 540 to 900 rpm. The cutter turns from 15 to 25 rpm. The gear-reduction ratio is 36:1.

Special Thrust Bearing: one Size 23 Kingsbury thrust bearing on the main pump shaft takes the runner thrust induced by the pump suction and protects the main turbine gear box.

Pumps: (1) two Northern fuel-oil pumps, 1¼-inch suction and discharge, driven by 3-hp Electro Dynamic motors.

(2) a DeLaval boiler-feed pump, driven by a DeLaval 6-stage steam turbine.

(3) a DeLaval boiler feed-water pump, electrically driven by a 75-hp Electro Dynamic motor.

(4) a Worthington 20-inch salt-water pump of 10,000-gpm capacity, driven by a 60-hp Electro Dynamic motor to furnish sea water for the main-condenser cooling system.

(5) a Worthington fire pump with 8-inch suction and 6-inch discharge, driven by a 50-hp Electro Dynamic motor.

(6) a Worthington 2-stage bearing pump with 6-inch suction and 4-inch discharge, which furnishes water under pressure to the cutless rubber bearings on the cutter head and the main-pump stuffing box; driven by a 50-hp Electro Dynamic motor.

(7) a Worthington condensate pump with 6-inch suction and 2½-inch discharge, which pumps water from the condenser to the preheater; driven by a 15-hp Louis-Allis electric motor.

(8) a Worthington single-stage condensate pump with 3½-inch suction and 2-inch discharge, driven by a 10-hp Electro Dynamic motor.

(9) a Worthington bilge pump with 6-inch suction and 4-inch discharge, powered by a 20-hp Diehl electric motor.

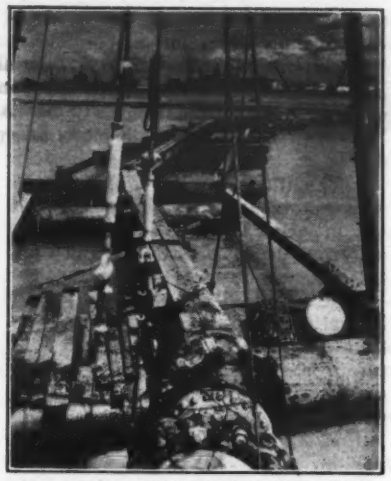
(10) a Northern gear pump for fuel-oil transfer, with 3-inch suction and discharge; driven by a 15-hp Electro Dynamic motor.

Oil Purifier: a Goulds Hydrol-Purifier purifies the lubricating oil from the turbine gear boxes and the Kingsbury thrust bearing.

Air Compressors: three Worthington compressors, driven by General Electric 5-hp motors. Running at normal load, two of these compressors furnish air for the boiler control board and for the operation of rams and brakes on the hauling gear.

Evaporators: two Size 18 Riley evaporators, made by Griscom-Russell Co., provide all fresh water used for the boilers and galley. They are generally run in series, using bleed steam from the main turbine, but in case the turbine stops a pressure-reducing valve in the line switches them over automatically to live steam.

Standby Generating Unit: a NLSCO 4-cylinder 235-hp diesel engine, made by New London Ship & Engine Works, drives a 160-kw Westinghouse generator to furnish power at 230 volts. This auxiliary plant is sufficiently large to operate bilge pumps, galley equipment and so on during periods when the boiler is cooled down.



The spiral-welded floating line of the dredge YM-20, in civilian life the Gulf Stream, is carried on 6 x 30-foot pontoons with 12 x 12 timber strongbacks, and is quite stable in rough water.

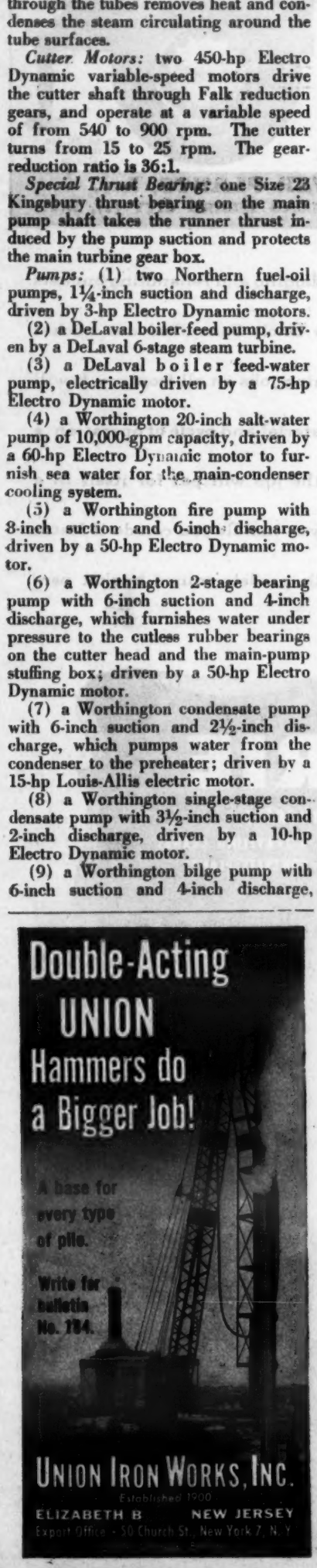
Miscellaneous Equipment: a General Electric 400-ampere arc-welding machine; a 220-volt G-E motor with 20-kw 120-volt generator for light circuit; a LeBlond Regal 13-inch machine lathe; a Robertson 2H power saw; a U.S. Electrical-driven bench grinder; a bench vise; a pipe vise; a Skilsaw ½-inch heavy-duty drill; a Black & Decker ½-inch electric drill; four Wright 8-ton hoists; and a Chisholm-Moore 6-ton hoist.

Hauling Gear: 6-drum, driven by a 100-hp Electro Dynamic motor through Jones reduction gears.

Personnel

The YM-20's work is all a part of the operation of a Seabee Construction Battalion. This is a special group made u

(*Concluded on next page, Col. 2*)





Model U-200S-I
This is the Rodgers Special Universal Press 200-tons capacity, mounted on a shop stand.

THE RODGERS UNIVERSAL PRESS, like the airplane, is designed for heavy-duty operation, without being cumbersome. It's portable — saves time and labor because you can take it right to your pressing, pulling, or lifting job. 4 models — 50, 100, 150, 200 tons capacity. For complete information, write or wire Rodgers Hydraulic, Inc., 7415 Walker St., St. Louis Park, Minneapolis 16, Minn.

Uses for **RODGERS UNIVERSAL HYDRAULIC PRESS**

Pulling Gears, Sprockets, Pulleys, Couplings, Sheaves, Drums • Wheel Press Work
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1. For example, the frame rods are heat-treated alloy steel, *3 times as strong* as ordinary steel rods of the same size.

2. We also use heat-treated alloy steel for the frame head and base, which have the capacity of iron castings 4 times their weight.

RODGERS HYDRAULIC Inc. If it's a Rodgers, It's the Best in Hydraulics



This portable service station is suitable for shop use or may be hauled to the job for on-the-spot lubrication.

ortable Lubrication For the Smaller Job

A small portable service station on o wheels, which will supply lubrica- on for construction equipment and ucks, inflate tires on all pneumatic- red vehicles or equipment, dispense ar lubricant or motor oil, and apply st preventive or other material to uipment or other surfaces has just en announced by the Alemite Divi- on, Stewart-Warner Corp., 1826 Di- rsey Parkway, Chicago, Ill. The unit pplies both high and low-pressure lu- rication, has its own air compressor iven by a gasoline motor, and uses e tubular base on which the entire unit mounted as an air tank or reservoir. ithout the wheels, it weighs only 246 unds and measures 29½ x 31⅛ ches.

When this service station is mounted a universal trailer-hitch, it can be wed behind a tractor, car, or truck, d taken anywhere for servicing equip- ent. Its primary function is lubrica- n. The two lubricant pumps, one high d one low-pressure, each delivers lu- icant from its own lubricant reser- ir or a 50-pound-capacity container. fter lubricants have been transferred om the original containers to the res- voirs, they are protected from dirt or it by clamped contamination-proof vers. One interchangeable power head, air motor, serves both pumps. A 1½- gasoline motor drives the air com- essor which maintains a constant pres- re of 130 pounds in the air storage nks through an automatic cut-off. The gh-pressure pump is equipped with a -foot lubricant hose having a 20,000- und burst pressure. The low-pressure mp for oil or gear lubricant has a 10- ot hose equipped with a control valve d non-drip nozzle.

While this self-contained lubrication it was designed primarily for the rm field, it will be welcomed by prac- ally every contractor as a compact, mplete, easily moved field lubricating tion. Complete information including ices may be secured by writing direct the manufacturer.

aPlant-Choate Appoints District Representatives

K. V. Turner has been appointed dis- t representative in charge of the shington, D.C., office by the LaPlant- oate Mfg. Co., Inc., Cedar Rapids, wa, manufacturer of earth-moving ipment. Mr. Turner's territory com- ses parts of Virginia, West Virginia, ryland, Pennsylvania, New Jersey, d New York. Other district repre- tatives appointed are A. C. Cart- ight, formerly district representative Mexico City, to handle the southeast- territory with headquarters at At- ta, Ga.; Milo Davin for the central t territory with headquarters in Cedar pids, Iowa; and S. I. Harris, who re- es his old post as district representa- e for northern California and Nevada er two years with the armed forces in ia and China. His headquarters will San Leandro, Calif.

Giant Dredge Helps To Dig Road to Tokyo

(*Continued from preceding page*)

of selected officers and men especially well heeled with a background of construction and marine dredging experience. Commander F. G. Elliott, CEC, USNR, is Officer in Charge, with Lieut. Commander C. E. McKay as his battalion executive officer.

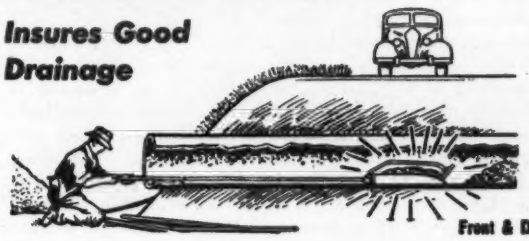
Lieut. Commander Herman J. Rossebo is the Navy skipper of the YM-20, with Lieut. (jg) R. E. Small, Ensign H. H. Brady, and Carpenter H. A. Campbell assisting him. In addition to A. L. Wiseman, other civilian technicians aboard the YM-20 include Chief Engineer N. C. Barrow, Chief Electrician T. H. Patterson, and Operators F. O. Porche, W. J. Guillot, and P. Di Giovanna. Seabee enlisted men have replaced all civilian technicians in all departments except that of chief engineer and chief electrician, and are doing splendidly, according to Commander Rossebo. Many of them came from places of high eminence in the construction world, and the fact that they are carrying on with jobs sometimes dismally low and menial accounts in no small way for the high digging time of the YM-20, nearly 20 hours a day on the average.

She is working, with other machines, on a base now staging part of the total war our forces are hurling against Japan. She will go forward in any areas, no matter how "hot", wherever and whenever she is needed.

Even though the engine of a car or truck is equipped with an oil filter, it is still necessary to change the oil. When the filtering element becomes clogged with dirt, it should be replaced with a new one, as a dirty filter is of no more value than none at all.

MORCO CULVERT CLEANER

Insures Good Drainage



Restore clogged culvert pipes to service with the "Morco" Culvert Cleaner. Quick-acting, non-damaging, easy operating "Morco" is the most satisfactory tool yet developed for this work.

MONARCH ROAD MACHINERY COMPANY

Front & Douglas N. W., Grand Rapids 4, Michigan

LITTLEFORD

"SPRAY MASTER"

The Master of Road Building

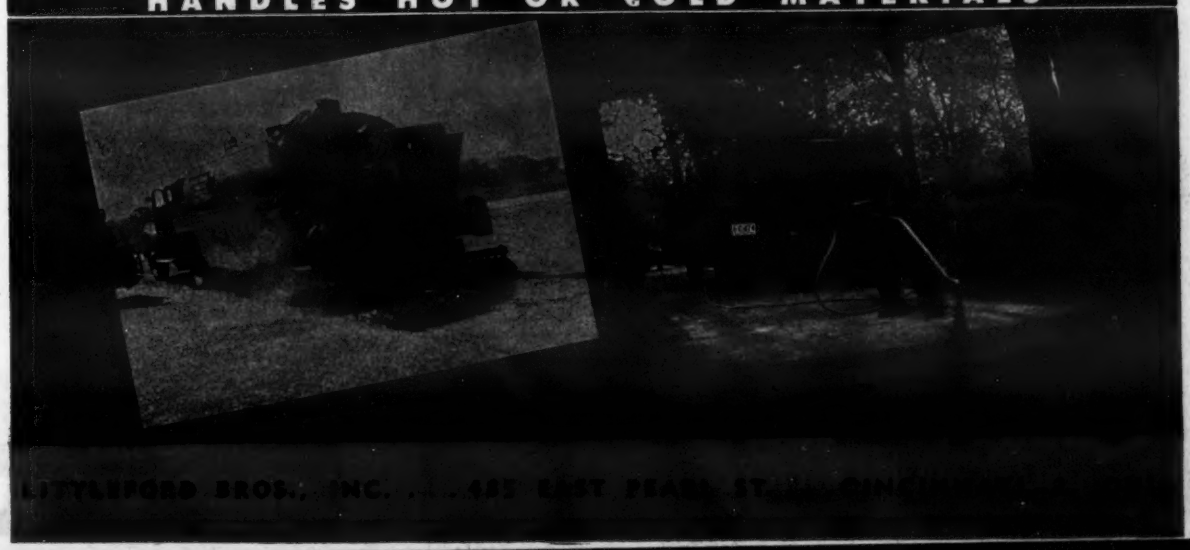


When building or maintaining Roads, Streets, Highways or Airport Runways let the "Spray Master" speed up work; cut the cost of applying Tar, Asphalt, Emulsions or Road Oils.

The "Spray Master" with the *Vacuum Flow Full Circulating Spray Bar* is one of the fastest and most efficient spraying units ever designed. This Circulating Bar circulates the materials through the Bar by *vacuum, not pressure*. It sprays under pressure with a Bar up to 24 ft. in width.

"Spray Master" is the master of Road Building. Have one of these low-cost Spraying units on your next road construction job.

HANDLES HOT OR COLD MATERIALS



LITTLEFORD BROS., INC. ... 455 EAST PEARL ST. ... CINCINNATI 2, O.

Uruguay Completes Two Concrete Bridges

The completion of a twin-bridge project on National Highway 3 in Uruguay is an important forward step in highway communication in that republic, shortening by nearly 40 miles the highway distance between Montevideo, the capital, and Paysandu, the republic's second city situated on the Uruguay River.

One of these new structures crosses the Rio Negro at Paso del Puerto and the other is over the Arroyo Grande about a mile away. The Rio Negro, Uruguay's largest river, flows southwestward to empty into the Uruguay River, and is joined by the Arroyo Grande stream. Both bridges are of reinforced-concrete construction, with 165-foot arches, the longest arches of this type ever built in that country. The Rio Negro Bridge has five arches and is 990 feet long, while the one over the Arroyo Grande has three arches and is 610 feet in length. Each has an 18-foot lane for two lines of motor traffic and 30-inch sidewalks.

This marks the completion of the second big bridge over the Rio Negro, which bisects the country from east to west. Two other bridges are being planned. As Uruguay is a comparatively flat country, much of the internal freight and passenger traffic is by truck and bus, and improvement of highway communications therefore results in great savings in time and money.

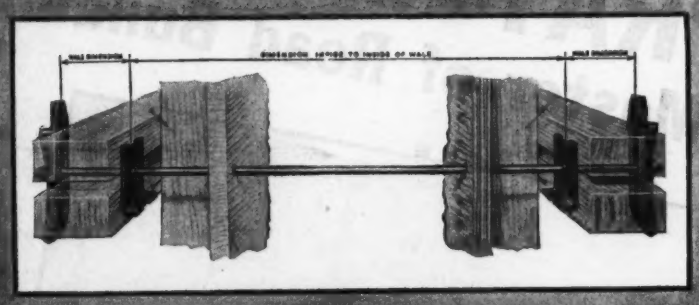
A Scoop and Shovel Run by Dump Truck

A ½-yard truck-mounted bucket has been developed by the Truk-Loder Co., Tiffin, Ohio. This unit, carried on a main frame of two 5-inch channels, is so rigged that when the dump body of the truck on which it is mounted is raised the shovel or scoop is similarly raised. Many uses of this device are possible, for material handling, for loading other trucks, and for pipe laying. A 1.1-cubic-yard bucket is available for handling leaves and light snow or refuse. The only power required for the operation of this equipment is the hydraulic hoist on the dump truck.

The Truk-Loder is easily removed and the dump body put back into regular service if desired. By replacing the bucket with a platform, the truck is automatically converted into one which can be used for bridge painting or for trimming trees, and with a gin-pole can be used for setting poles and laying pipe.

Complete information on this new device for converting dump trucks into loaders may be secured direct from the manufacturer by mentioning this item.

RICHMOND A. C. FORM-TYS
offer
Advantages for Architectural Concrete Wall Forms



Patent No. 2,222,339

The Richmond A. C. Form-Ty is a 3,000 lb. safe load tie unit especially designed for requirements of architectural concrete walls assuring dimensional correctness as well as architectural finish and

Provides for:

- Small clean hole (less than ¼" diameter) for grout patching.
- Spreading action between wales to gauge wall thickness.
- Available in pull-out type for complete withdrawal or, 1½" break back if desired.

Approved by Portland Cement Association

Richmond Offers—consultation on best types of forms and ties to be used for a given job; estimates on job requirements and recommendations on specific form problems. All of this is without obligation. Richmond's method of packing and shipping is a distinct service in itself.

Richmond Reusable Accessory Devices—known as "Working Parts" are furnished RETURNABLE FOR FULL CREDIT — no rentals charged.

Form-Ty Engineering Guide on Request

SEE OUR CATALOG IN SWEET'S

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816 LIBERTY AVENUE, BROOKLYN, N. Y.
MANUFACTURING SINCE 1911

TESTED and APPROVED for use on high tensile strength wire rope, by Underwriters' Laboratories—official testing laboratories for insurance companies.
ONE SAFE-LINE CLAMP is designed to hold any wire rope without slipping.
WIRE ENDS ENCLOSED. No needle-sharp wire ends, nuts and bolts exposed to injure workman's hands.
STREAMLINED! Will not catch on clothing nor on mechanical apparatus. Will not foul.
HOLDS A TIGHT THIMBLE. When thimbles are used they will not loosen and fall out.

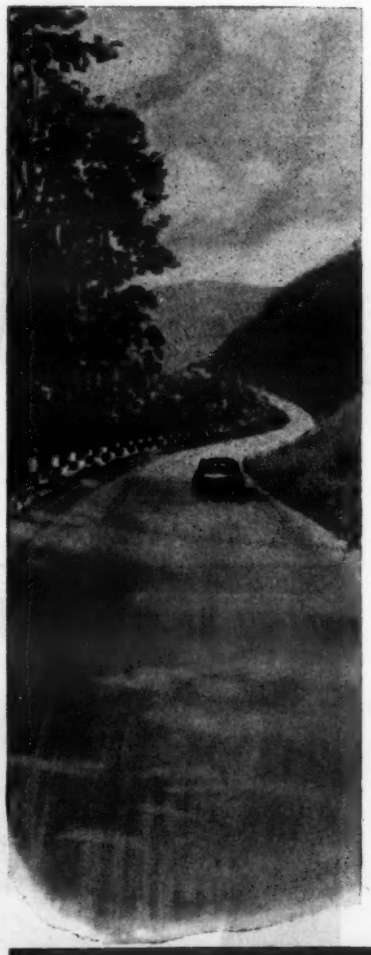
SAFE-LINE
WIRE ROPE CLAMPS



Write for details of this—the only PERFECTED wire rope clamp on the market. Millions used by Manufacturers, the Armed Forces and Industries.

NATIONAL PRODUCTION COMPANY
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MORE AND BETTER ROADS
the Calcium Way



Local highway officials in many areas have worked wonders building good roads, The Calcium Way. They have built them with local labor and local soil materials treated with calcium chloride.

That's the way to get more and better roads for the money—the way to make low-cost roads give longer wear and satisfactory service — the way to make them dustless, smooth and clean.

Local soil materials, bound together with the moisture bond that calcium chloride supplies and holds, will compact under traffic into a consolidated mat. Such a roadbed sheds rain and lessens frost heaving. Properly treated with calcium chloride it does not dry out, so it cannot crumble and blow away.

This type of road can be built for less The Calcium Chloride Way. It can be maintained at a fraction of the cost of maintaining untreated roads and will provide the finest type of base for later concrete or blacktop paving. You do get more and better roads The Calcium Chloride Way. Bulletin No. 29 tells how. It is sent on request.

Calcium Chloride Association
4145 Penobscot Building
Detroit 26, Michigan

Dust is the cement in your gravel road
Save it with
CALCIUM CHLORIDE

New 1.1-Mile Road Unit of Expressway

Section With 22-Foot Concrete Paving Will Be Part of 125-Mile System; Built on 204-Foot R/W

A CONTRACT for 1.1 miles of 22-foot concrete paving on Mound Road in the north central part of the city of Detroit was recently completed by the Thomas E. Currie Co., Detroit, Mich., for the Wayne County Road Commission. For the northern ¼ mile of this length, a double 22-foot pavement was laid, and the contract, which amounted to $88,000, also covered drainage structures, sidewalk and curb.

This road will eventually be a unit of the 125-mile network of Wayne County's express-highway system in and around the city of Detroit. For this reason, the Commission took a 204-foot right-of-way for this project, which at some time in the future will be a dual highway, each roadway 22 feet wide, for its full length. The necessary right-of-way was acquired entirely by condemnation as is now the practice in all the County's land acquisition. In the experience of the Commission, this has been a speedier and more satisfactory method than to enter into negotiation for land purchases. After the land was acquired, the utility companies moved back their poles along the right-of-way to the rear limits of the 204-foot strip.

Excavation and Grading

Thomas E. Currie Co., contractor for this section of the highway, sublet the excavation, including disposal, and grading to Charles J. Rogers Co., also of Detroit. The earth excavation totaled 13,188 cubic yards. As the clay soil was not deemed suitable sub-base material, it was removed for a 1-foot depth below the grade of the bottom of the pavement and replaced by sand from a borrow pit located at about the center of the job. Fifteen trucks of various makes and sizes made the haul from the borrow pit which in turn was backfilled with the clay from the roadway excavation.

For the grading, the Charles J. Rogers Co. used a 1-yard Bay City dragline, a Northwest Pullshovel, two Caterpillar RD8 tractors with bulldozers, and a LeTourneau scraper. The Northwest was also employed, along with a Cleveland trencher, for digging the drainage ditches. The fill was compacted only by the trucks and other equipment passing over it.

Drainage

A 6-inch vitrified subsoil drain was laid on both sides of the road, 13 feet off the center line and 5 feet below the center-line grade of the finished pavement. The bells of the pipe were laid facing upgrade and the lower half of each joint was filled with a mortar composed of one part cement to two parts sand. These joints were then covered with at least 3 inches of hay or straw. The trenches for the pipe varied in width from 12 to 24 inches and were backfilled with sand and gravel.

Below the side drains and located 5½ feet off the center line is a 12-inch concrete storm sewer. With the combination of the 12-inch porous sub-base, the two paralleling side drains, and the center-line storm sewer, together with fifty-two catch basins and seventeen manholes, this road is assured of adequate drainage.

Concreting

The batching plant was set up at the center of the job and consisted of a 200-barrel Butler cement bin, a 35-ton Butler bin for the sand, and a 50-ton bin for the stone. Bulk cement was hauled by truck and trailer from the Peerless Cement Co. in Detroit; sand came by truck from Hieckman Van Avery Co. at Northville, about 20 miles distant; and the coarse aggregate, a slag from the blast furnaces of the Great Lakes Steel Corp. at Zug Island, Delray, Detroit, was hauled by truck. A Koehring 503 1½-yard crane serviced the aggregate bins. Water was tapped from the city hydrants along Mound Road.

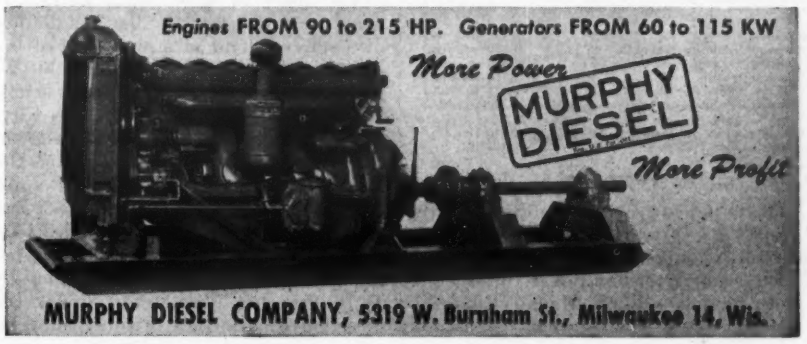
Before the forms for the concrete pavement were set in place, the subgrade was fine-graded by an Austin-Western power grader. The final grade was prepared by a Lakewood subgrader running on the Lakewood and Heltzel forms.

A Ransome 34-E paver laid the 10-inch plain-concrete pavement of 1:1½:3 mix, with a 1½-inch parabolic crown, the full 22-foot width. Expansion joints were placed 75 feet apart and dummy joints every 25 feet. The cement used contained Vinsol resin, added at the time of grinding, and as the mix was very dry all floats were metal shod. Because there was no water sheen, the finishing machine followed the pouring as closely as possible. The tendency for the finisher to pick up and roll the aggregate in this dry mix was counteracted by slowing down the forward progress and speeding up the screeds of the finishing machine. For curing, burlap was put on the slab and kept wet overnight. The next morning the burlap was removed and Aquastatic curing compound sprayed on.

Shoulders 8 feet wide were then constructed with a slope of ¾ inch per foot. They consist of a 4-inch layer of compacted gravel with a maximum size of 1 inch and a minimum size passing a No. 10 screen.

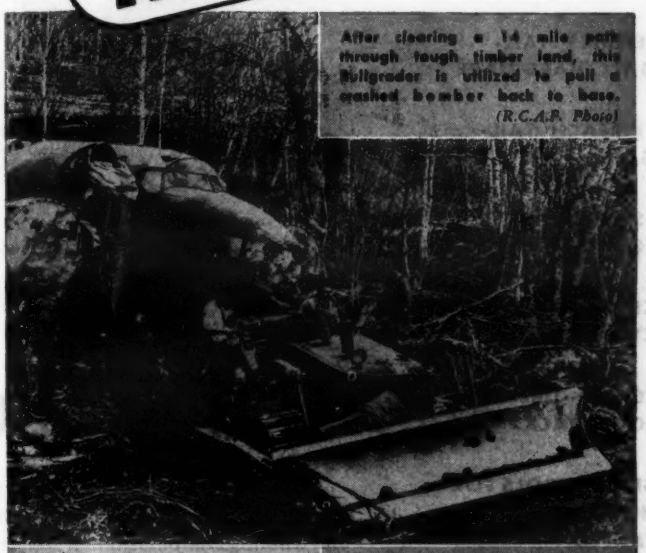
In sections that called for a curb, a 24-inch-deep concrete curb was built 6 inches wide at the top and 7 inches wide at the bottom. The top of the curb is 6

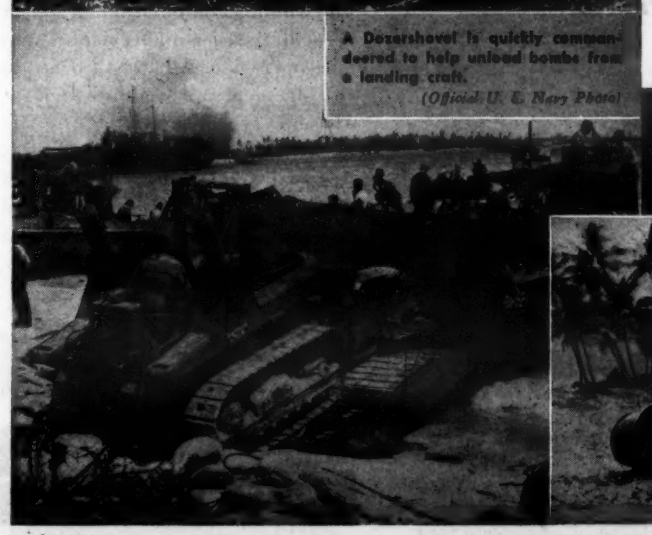
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Bulldozers are taken in water deeper than 3 ft. to drag a timber ramp to the waiting wave of an LST. (Engineering News-Record Photo)

APPLIED INGENUITY . . . the GI Stock in Trade


After clearing a 14 mile path through tough timber land, this Bullgrader is utilized to pull a crashed bomber back to base. (R.C.A.F. Photo)


A Dozershovel is quickly commandeered to help unload bombs from a landing craft. (Official U. S. Navy Photo)


Usually used to build roads, this dual unit Bullgrader-Scraper cleans debris from a tropical beach. (Official U. S. Navy Photo)

Nowhere is the outstanding resourcefulness of the American fighting man better demonstrated than in his brilliant use of tractor equipment in the battle areas. Typically, he has converted Bullgraders, Bulldozers, Dozershovels, Scrapers, etc., into decisive instruments of war.

To the American fighter in every battle zone, Bucyrus-Erie tractor equipment units are familiar friends. His ingenious application of them plus their efficient performance proves again the invincibility of combining superior men and machines. Together they are potent factors for Victory — and the best bet for profits on tomorrow's peacetime jobs. Bucyrus-Erie Co., South Milwaukee, Wis. N-62

BUCYRUS ERIE TRACTOR EQUIPMENT

See Your INTERNATIONAL TRACTRACTOR Distributor

New 1.1-Mile Road Unit of Expressway

(*Continued from preceding page*)

inches above the adjoining pavement. The paving slab was keyed for the connection.

Major Quantities

The major quantities on this contract were:

Item	Quantity
Excavation	13,188 cu. yds.
Pavement sub-base backfill	4,310 cu. yds.
Plain-concrete pavement, 10-inch	18,330 sq. yds.
Concrete curb	1,158 lin. ft.
Concrete sidewalk, 4-inch	4,179 sq. ft.
Compacted gravel shoulders, 4-inch	11,390 sq. ft.
Vitrified pipe, 6-inch	13,212 lin. ft.
Concrete pipe, 12-inch	4,810 lin. ft.
Concrete pipe, 18-inch	103 lin. ft.

Personnel

Forty-five men were employed on this project by Harvey Kruse, Superintendent for Thomas E. Currie Co., Detroit, Mich., contractor for this 1.1-mile concrete paving job on Mound Road in Detroit. Work was started August 1, 1944, and the project was completed by the middle of October. Leroy C. Smith is County Highway Engineer for the Wayne County Road Commissioners, John K. Norton is Engineer of Highways, and George S. Burr was Resident Engineer on this project.

Wellpoints Predrain Soil on Sewer Job

The story of how Stang wellpoints dried up quicksand for the installation of a sewer is told in a new "Job of the Month" bulletin issued by the John W. Stang Corp., 2 Broadway, New York 4, N. Y. The job, located at Texas City, Texas, embodied a new sewer design to minimize breakages in quicksand, as the pipe will stay rigid in unstable soils, with pipe joints tight. A 3,000-foot line was built in quicksand, installed 3 to 6 feet below sea level, and 3 to 10 feet below ground level. The job was done by T. A. Newman, contractor, under the direction of Ed Niles, Project Superintendent, and Joseph P. Rady, Fort Worth consulting engineer, who designed and supervised the project.

To provide firm dry soil, a Stang wellpoint system was installed which not only dried up the quicksand for the sewer trench, but kept each trench section dry for 48 hours after the pipe was laid, the concrete cover and cradle placed, and backfill completed 2 f above normal ground-water level.

Copies of the bulletin, with fact diagrams, photos, and data on how th job was done, may be secured by inte ested contractors and engineers direc from the John W. Stang Corp. by re ferring to CONTRACTORS AND ENGINEE MONTHLY.



WHERE GRADES ARE STEEP — LINN HAFTRAK SINCE 1916 — AND MUD IS DEEP

LINN contour-following manganese steel tracks permit the utilization of the great power built into these units. This makes possible the negotiation while fully loaded, of steep grades and rough terrain with the maximum of speed, smoothness and economy. Linn Haftraks and Traktailers are built from 5 to 50 tons capacity. Send for catalog.

THE LINN MANUFACTURING CORPORATION

Morris New York

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Look to HERCULES for *All* THESE FEATURES

- ✔ PISTON-TYPE CONTROL VALVE
- ✔ CENTER-LIFT HOIST
- ✔ REVERSIBLE TAIL-GATE HARDWARE
- ✔ EASY-REACH TAIL-GATE LEVER
- ✔ HOIST MOUNTS ABOVE FRAME
- ✔ ACCESSIBLE HOIST CYLINDER
- ✔ PATENTED TIRE AND TOOL PACK
- ✔ DASH CONTROLS FOR HOIST AND TAKE-OFF

Only from Hercules do you get all these advantages for easy, low-cost, efficient operation and maintenance. For example—consider the fingertip controls which operate Hercules hoists and power take-offs. Pull out two buttons . . . up goes the body and the load is dumped. Push the same two buttons . . . the body slips down into road position. Simple, isn't it? And it's only one of a host of reasons why you'll want Hercules dump bodies for your postwar trucks.

Until you can get the new Hercules dump body you want, let your Hercules distributors keep your present equipment in running order. He will furnish the service you need.



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Deliver cement at the right time, in perfect condition and without splash or dust, with Hercules Turn-O-Matic Cement Boxes. Immediate delivery. Write today.

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DUMP BODIES AND HYDRAULIC HOISTS
SPLIT SHAFT POWER TAKE-OFFS • COAL CONVEYORS

HERCULES STEEL PRODUCTS COMPANY GALION OHIO



Winning Combination

In the Insley Excavator, you get a hoist and swing mechanism with the winning combination for longer wear-life, easier maintenance, simpler operation. All 10 ball bearings are shielded . . . pre-lubricated for the life of the machine . . . no grease works into clutch or brake. Its two main drum clutches and two swing clutches are all identical . . . one spare clutch band is all you need. The drum shaft is extra large and is accurately ground. Gears are cut from solid steel blanks.

You'll like these features of design and construction because—*like every other Insley feature*—they contribute to *lower cost yardage*. For your new equipment—when we can again supply it—choose a ⅜ or ½-yd. Insley Excavator . . . with five easily interchangeable attachments—shovel, crane, hoe, clamshell and dragline.

EXCAVATORS INSLEY CONCRETE EQUIPMENT

INSLEY MANUFACTURING CORP., INDIANAPOLIS 6, IND

Better Administration For County Highways

One Progressive County Asks State Legislation To Place Responsibility Solely on County Engineer

WHAT one county is trying to do should be the ambition of every county in the United States where the responsibility for the construction and maintenance of county roads is divided among the various elected commissioners. Under the latter system, it is inevitable that all road and bridge funds will be divided quite equally among the commissioner districts and spent there with considerable political acumen rather than expended on projects which will benefit the county as a whole.

There are many states which need a uniform county highway law, permitting the employment of a competent engineer by each county, or a group of counties, enabling them to get away from the idea of from three to six road commissioners dividing the county up into distinct working areas comparable to that represented by each commissioner. This encourages unfavorable competition among areas, whereas a commissioner should act in an advisory capacity dealing with the highway problems of the entire county.

What One County Has Done

To Madison County, Tenn., goes the credit for securing the passage of Chapter 58 of the Private Acts of 1945 by the Tennessee State Legislature and its approval by the Governor on January 29, 1945, so that it became effective on April 1, 1945. The title of the act amends an act applicable to counties with a population between 34,000 and 40,000, census of 1910, which makes the act applicable only to Madison County.

Section I of this act abolishes the county board of highway commissioners and confers the authority of these commissioners on a county engineer to be elected or appointed by the County Court for a period of two years.

Under Section II, the salary is set at not more than $5,000 per year, in order to attract a capable engineer. However, the two-year term for which the engineer is appointed is rather short and, regardless of the salary, it may be difficult to secure a competent engineer who would desire to make a connection which could be terminated with 30 days' notice and a hearing before the County Quarterly Court in regular or special session.

On the credit side of the ledger, the bill requires that the county engineer must be a graduate of an accredited engineering school with at least five years' experience in road building, and that he must be furnished adequate transportation for the transaction of all business pertaining to county roads, which includes the upkeep of an automobile and fuel to operate it. The bill also provides that the County Court furnish the county engineer with proper office space, together with such office personnel and office equipment as is necessary to transact his duties; that the county engineer shall have authority to hire or discharge all employees under his supervision; and that he have the authority to fix salaries for those employees, subject to the approval of the County Quarterly Court.

The county engineer is required to submit a written report to the County Quarterly Court, at each of its regular quarterly meetings, upon the work done for each preceding quarter and also a report on work proposed to be done on the county roads for the succeeding quarter. In addition, he is required to make an annual report to the Court at its April term each year.

Section V gives the county engineer charge and supervision of the county workhouse, and of all equipment, facilities or properties owned by Madison County for the purpose of building and maintaining the roads of the county.

Go and Do Thou Likewise

Raymond B. Traver, President, Association of Highway Officials of the North Atlantic States and past president, County Officials' Division, American Road Builders' Association, states (C.& E.M., May, 1945, page 59), "It was quite a surprise to the writer to find, on inquiry about two years ago, that out of the 3,000 counties in the United States, the highway departments of only about 800 were headed by engineers and that only approximately one-half of these were qualified through their own organizations to make surveys, plans and estimates for highway construction. This condition is due, to a large extent, to the method of selection of the county engineer or surveyor, term of office, and salary. We find that in many states the office is elective and open to any one who cares to 'run'. In other localities, the position is a political football to be passed around every two years or so to

(*Concluded on next page, Col.* 3)



"Oh, this is just a scale model of one of our post-war plans."

Anchor Flexible Hose Assemblies

For: • High Pressure • Medium Pressure • Low Pressure Installations



Anchor Ductile Sleeve High Pressure Couplings, factory assembled to hose, will give unfailing service on your hydraulically operated machinery. Maximum flexibility and dependable units available in specified lengths from 3/16" I.D. to 1½" I.D. inclusive.

• • • •

ANCHOR COUPLING COMPANY, Inc.
342 N. Fourth St., Libertyville, Ill.
Factory Branch:
12841 Cloverdale Ave., Detroit, Mich.





A new safety glove made by the American Optical Co. is designed to give maximum protection and long wear on all types of heavy-duty operations.

New Safety Glove

The principal feature of the new safety glove recently announced by the American Optical Co., Southbridge, Mass., is its one-piece back construction, thus eliminating seams on the back to catch sparks or molten metal when the glove is worn by welders. Made from high-grade chrome-tanned cowhide, the glove is equally useful in providing hand protection in other types of heavy-duty operations.

The Gunn style of manufacture reduces the number of seams to a minimum, and for added strength and protection, all vulnerable seams are welted. According to the manufacturer, this glove is carefully designed and expertly made to give long hard wear on the toughest types of jobs.

New Athey President

B. F. Lease was elected President of the Athey Truss Wheel Co., Chicago,, Ill., at a recent meeting of the Board of Directors. Mr. Lease, who succeeds the late C. Kier Davis, has been connected with the company in various capacities since 1931. Prior to that time he had served for many years with the Republic Truck Co. and Lynn Mfg. Co.

Better County Roads

(*Continued from preceding page*)

someone who is willing to take over the work at the salary offered. In the most progressive counties, the appointments are made by a board or commission which has general supervision over the county road system, while in a few states, the position is protected by Civil Service and the selection is made from a list of candidates who have qualified in an open competitive examination."

Any county which does not now provide adequate engineering service and freedom of action for the county engineer should do its utmost to set up a proper organization under a single responsible engineer, in order to take its place among the progressive counties.



The power shovel or dragline which is equipped with a Twin Disc Hydraulic Coupling is freed from excessive strains and shock loads on lines, transmission and engine. It "hits the bank easy"—crowds smoothly and steadily because shocks are not transmitted from work to engine . . . neither are the engine's torsional vibrations transmitted to the working parts of the shovel or dragline. Result: longer wear-life of the unit—less work for the operator. Why not discuss these points with our Hydraulic Division? TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

ARMY E NAVY

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918



BITUVIA *Road Tar*

FIRST AID
FOR
Neglected Roads...





This pocket-size *BITUVIA* manual sent on request.

● Neglected pavements—long overdue for repairs—must receive attention this year if highway investments are to be safeguarded. Reilly BITUVIA, combined with aggregate when necessary, will waterproof cracks and give a new, skid-resistant surface that will mean many extra years of service. The application of BITUVIA requires a minimum of equipment and man-hours per mile.

BITUVIA APPLICATIONS: HOT PLANT MIX, for base and wearing course; TAR PRIME, for maximum moisture resistance; BASE STABILIZATION, for low-cost, long-lived construction; ROAD MIX, for economical mixed-in-place construction; COLD PATCH, for spot patching and preparation of stock pile mixtures; RETREAD, a typical treatment of stone, gravel, sand-clay or slag road surfaces.

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana

221 S. DAMEN AVENUE, CHICAGO, ILLINOIS — 500 FIFTH AVENUE, NEW YORK, N. Y. — ST. LOUIS PARK, MINNEAPOLIS

SEVENTEEN · PLANTS · TO · SERVE · YO

Asphalt Replaces Mud, Stops Joint Pumping

Effect of Heavy War Traffic Corrected by Pumping In Asphalt Cement to Seal Out All Surface Water

THE pumping of concrete pavements at joints was not prevalent in Ohio prior to 1940. The concentration of war industries in the state, with the attendant increase in the volume and weight of truck traffic, has resulted in a very rapid increase in the distribution and the rate of pumping by concrete pavements. Charles W. Allen, Chief of Testing Laboratory, and Harry E. Marshall, Geologist, Bureau of Tests, Ohio Department of Highways, are reporting the methods and equipment used to prevent pumping in a paper prepared for the Twenty-Fourth Annual Proceedings of the Highway Research Board.

Causes of Pumping

It is generally agreed that most of the water contributing to pumping is surface water. A number of observations made in Ohio substantiate this point. On a project constructed about twelve years ago, which had shown no signs of distress until wartime restrictions on a refinery in the southern part of the state resulted in a tremendous increase in truck shipments, pumping occurred generally throughout the section except for areas where the joints were tightly sealed, preventing the entrance of surface water. Further evidence that the water was derived principally from the surface is afforded by the fact that on most of the projects observed there is practically no difference in the amount of pumping on fill and in cut sections. It has also been noted on several projects that less pumping occurs in areas where a paved gutter at the edge of the pavement carries off the surface water before it has an opportunity to reach the subgrade.

Checking Pumping

Approximately 1,000 joints and cracks were treated in Ohio with 60 to 70-penetration asphalt in 1942, and only a very few of them were pumping mud in the early autumn of 1944. There were some instances, however, of exuding of the asphalt cement from the cracks and joints. About 200 joints were treated that same year with 50 to 60-penetration asphalt cement but, although this asphalt showed less exuding than the 60 to 70-penetration material, it was thought that a higher-melting-point material with a lower temperature susceptibility would be desirable and was therefore used in 1943 and 1944.

As an indication of the amount of material necessary to treat pumping joints, it was found that on one project treated in the summer of 1944 an average of 40 gallons per joint was used to treat 284 joints. The quantity of material, of course, varied considerably for individual joints. At some joints as much as 60 gallons of material was used without raising the slab.

Equipment Employed

The Maintenance Bureau of the Ohio Department of Highways supplied the equipment and did the actual work of pumping the asphalt into the joints to seal them and prevent mud pumping. The equipment used included an air compressor, jackhammer and drills to make the holes in the pavement and blow out the mud and water, and a bituminous pressure distributor. The distributor was equipped with a patching hose and a bung-type bituminous nozzle which could be put in the hole in the pavement and driven snug with a hammer before the asphalt pumping was started. It was found that the bituminous distributor should be equipped with a by-pass pressure regulator so that pressures between 20 and 40 pounds per square inch could be maintained. It should also be equipped with a reversible pump or a suck-back arrangement so that a small amount of the asphalt may be sucked out of the hole immediately before removing the nozzle in order to prevent asphalt squirting out on the pavement.

A sprinkling can with water to wet the pavement around the hole, so that any asphalt leakage can be removed easily, is another auxiliary. The water is also used to chill any asphalt that may break out of a crack or joint before the desired amount has been pumped under the pavement.

Soft-wood cylindrical plugs turned to a diameter ⅛ inch larger than the hole in the pavement are provided to be driven into the hole after the treatment is completed.

A crew of six to eight men is required for the operation. Two or three work with the compressor to drill and blow out the holes and four or five with the distributor.



The nozzle used in Ohio for pumping bituminous material beneath concrete pavement.

Sequence of Operation

A short trench is dug slightly below

(*Continued on next page*)

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	S.A.E. grade at start of test	S.A.E. grade at end of test
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Average of 10 approved* oils .	S.A.E. 30	S.A.E. 40
A high grade conventional oil .	S.A.E. 30	S.A.E. 50

*Approved for use by Army Specification 2-104 B

All of the above oils were subjected to the same test—one of the tests required for approval under Army Specification 2-104 B. Stanolube HD showed less viscosity increase than any one of the ten oils tested and considerably less than the average of all.

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Asphalt Replaces Mud, Stops Joint Pumping

(*Continued from preceding page*)

the depth of the pavement slab at each end of the joint or crack to be pumped. This serves as a sump for the mud and water blown from under the slab and also for observation when asphalt is being pumped in. A hole is drilled through the pavement usually about a foot ahead of the joint in the direction of travel and 1 to 2 feet away from the center longitudinal joint. Water and mud are blown out by forcing compressed air into the hole, using the asphalt nozzle. In specially wet areas it is desirable to blow out the water and the mud immediately before injecting the asphalt. In dry areas this operation may be carried out well in advance of the asphalt pumping.

The asphalt is heated to a temperature of 350 to 400 degrees F. The injector nozzle is attached to the patching hose of the distributor and driven into the hole. Water is sprinkled around the hole to wet the pavement so that any spillage may be removed easily and then the asphalt pumping is started.

Pressures from 20 to 35 pounds per square inch have been found to be entirely adequate to fill the space beneath the slab and even to raise the slab. Using this comparatively low pressure, a man standing on the nozzle plate can hold the nozzle securely in the hole.

Pumping is continued until the asphalt exudes from under the pavement at the observation trench or until the slab starts to rise. If the slab starts to rise before asphalt exudes from under the edge of the pavement or if asphalt exudes from one edge of the pavement and not the other, it is considered desirable to drill another hole and attempt to force in more asphalt. Should the asphalt break out at a crack or joint on the surface of the pavement during the pumping operation, pumping should be stopped for a short period, the asphalt chilled with water, and the pumping then continued. If the leakage continues after this treatment, it can usually be stopped by placing a chunk of stiff clay or mud over it and holding it down by a man standing on it.

When sufficient asphalt has been pumped in, the pump is stopped but the nozzle is allowed to remain in the hole for 30 seconds before it is withdrawn. If the distributor is equipped with a suck-back arrangement, the pump motor should be reversed for a few seconds before the nozzle is removed so that the asphalt will not exude from the hole before the plug can be inserted. Immediately upon the removal of the nozzle the soft-wood plug is driven into the hole flush with the pavement and the spillage scraped off.

This same procedure was used successfully to raise slabs, except that the holes were usually drilled 18 to 24 inches from the crack or joint and midway between the center joint and the edge of the pavement. Should the slab start to rise at a high place, a loaded truck may be backed over it and thus hold down the part of the slab that is already high enough.

The asphalt was obtained hot in insulated tank cars direct from the refinery. It generally arrived at slightly too low a temperature to be pumped into the distributor and at times it was necessary to heat it 8 or 10 hours with steam at 80 to 90-pound pressure. It usually could be pumped into the distributor at a temperature of 280 to 300 degrees F, after which it was brought to the application temperature in the distributor if heating in the distributor was found more desirable than raising the temperature the rest of the way in the tank car.

No casualties were experienced by the men being splashed with the hot asphalt. As a safety precaution, however, it is desirable for the men to wear heavy clothes, gloves, and a welder's mask.

Conclusion

The use of bituminous material pumped beneath the slab to stop pumping of concrete pavements in Ohio has been much more successful than the various types of mud mixtures tried. In all probability one of the principal reasons for the success of this material is the fact that it forms a tight seal beneath the pavement and thus prevents the entrance of surface water. Further, its stability is

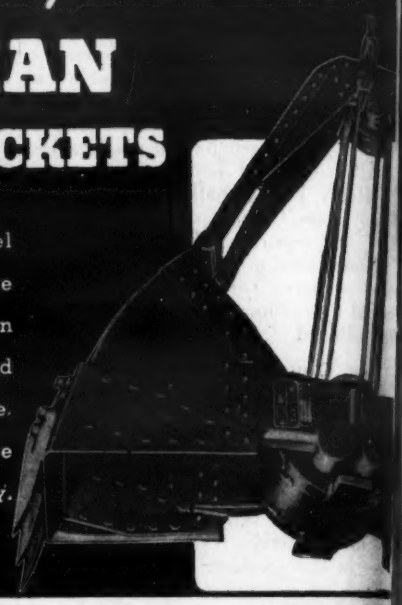
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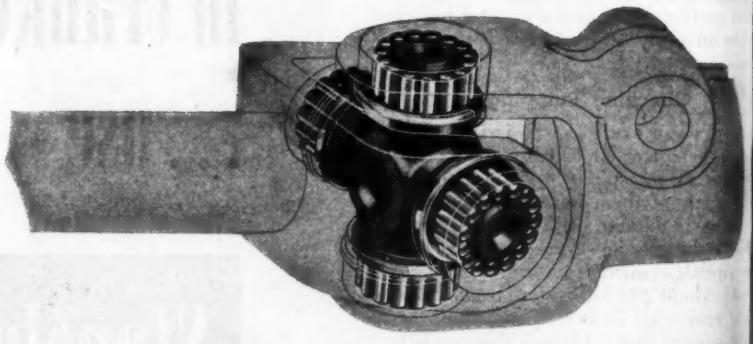
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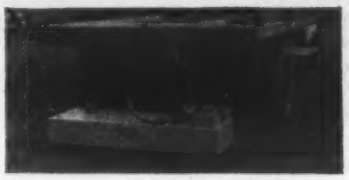
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Asphalt Replaces Mud, Stops Joint Pumping

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not appreciably affected by water which may reach it through the subgrade. Bituminous material is considerably easier to control when being pumped beneath the pavement since it apparently spreads more evenly than slurries. There is considerably less likelihood of cracking the slab than with slurries and it is easier to keep from raising the slab, or to control the amount by which the slab is raised if this is necessary. Although when asphalt is used the cost of the material is somewhat higher than for slurries, at least a portion of this cost differential is made up by the fact that no labor is required for assembling and mixing the materials.

From the experience gained to date, the Ohio engineers report that bituminous materials show considerable promise as an effective treatment for pumping of concrete pavements.



This new electro-magnet sweeper is designed to remove tramp iron quickly and thoroughly.

New Magnet Removes Iron From Roadways

A new rectangular high-intensity electro-magnet is now available for sweeping roads clear of tramp iron. The unit is a double-gap model with the gaps constant at all points to promote an even distribution of the magnetic flux over the entire magnet face, according to the manufacturer. It is claimed that the equal pull thus exerted enables the magnet to remove tramp iron from all of the road area covered.

The new-model road-sweeping magnet operates from a generator set carried on the truck bed and comes in a complete range of sizes to meet any requirements. The magnet is suspended at the rear of the truck close to the ground. Complete units, including magnet, generator, and trailer, are available from the Dings Magnetic Separator Co., 509 E. Smith St., Milwaukee 7, Wis.

Complete information and further data as to sizes may be secured direct from the manufacturer by mentioning this illustrated news item.

Mack Names Ewell Mgr. Of Southern Division

Elliott G. Ewell has been made Vice President and Manager of the Southern Division of Mack-International Motor Truck Corp., with headquarters at 730 Peachtree St., Atlanta, Ga. Mr. Ewell has been connected with the Mack organization since 1924, first as salesman and later as Manager in the Charlotte, N. C., branch office.

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